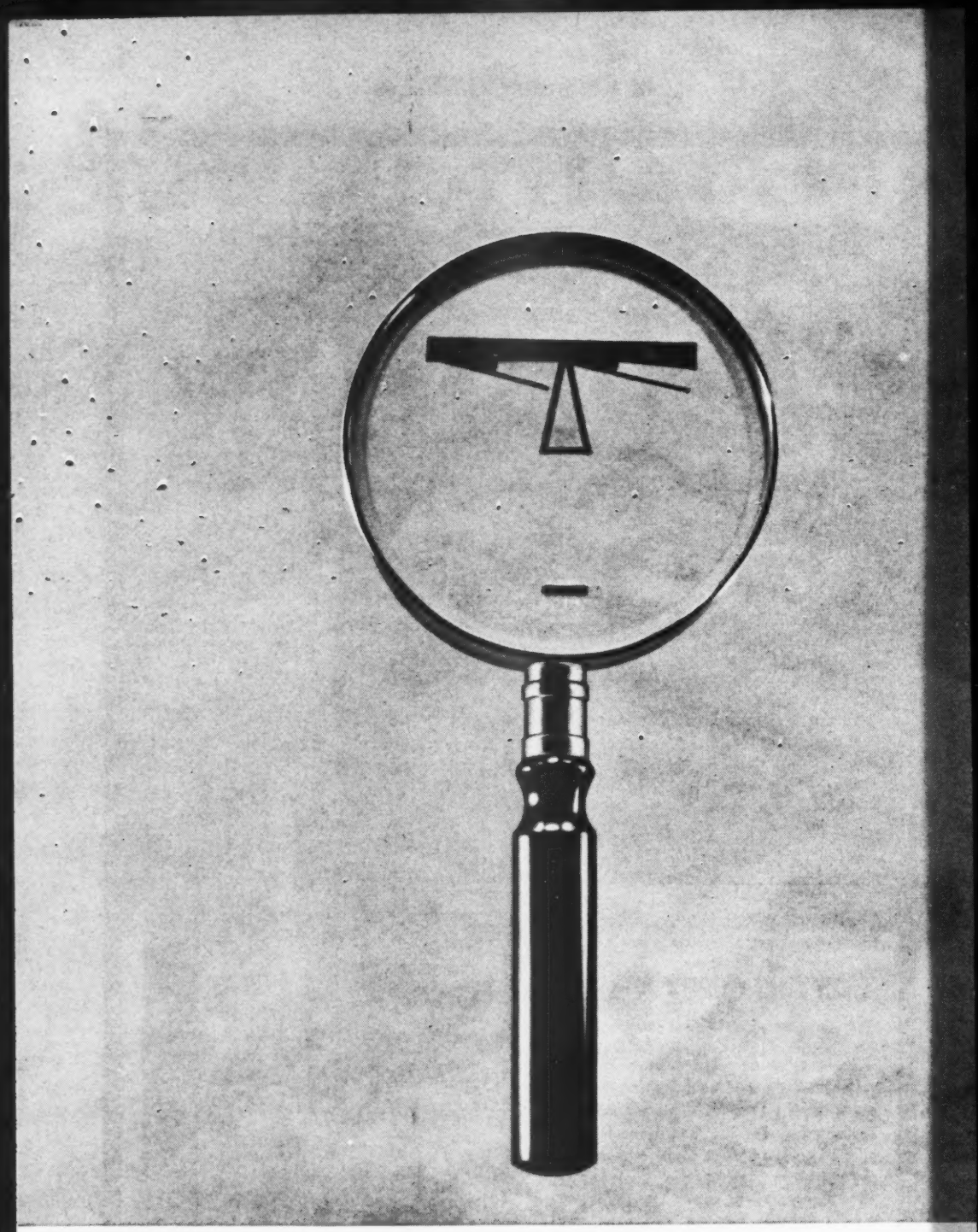
November 1965

Agriculture

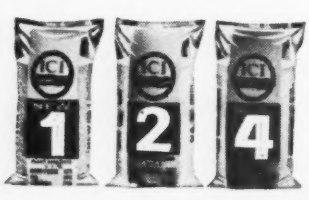
Vol. 72 No. 11

SELECTED CONTENTS

Published for the Ministry of Agriculture, Fisheries and Food by Her Majesty's Stationery Office



we're looking for a private eye hot on the track of a good buy



The sort of farmer who does a little detective work–on his costs. Who conclusively proves that buying fertilizer on early delivery rebate pays, and buying ICI pays even more. Evidence: ICI compounds are concentrated. Save handling and carting costs. Speed up application time. Reduce storage space.

What's more, ICI concentrated compounds are free-flowing for trouble-free use and packed in polythene for easy storage—can be kept under any kind of roof. For the best buy of all, order ICI concentrated compounds on this month's EDR. See your merchant now.

ICI

BAGS OF FARMING EXPERIENCE

industrialised buildings

FOR YOUR FARM IMPROVEMENT SCHEME

The **Agrecon Concrete Building System** uses large-scale production of a range of well-designed units, giving remarkable economy without sacrificing almost unlimited flexibility of layout. As in the case of the building illustrated, design and layout can be suited to your particular needs. With this you will also have the advantages of **low initial cost, quick erection, no maintenance charges,** and a solid practical structure which will last more than a lifetime.

If you are considering farm improvement, now is the time to discuss your ideas with us. We shall be pleased to give you a free quotation, which normally includes for foundations and complete building erection.

AGRECON **CONCRETE BUILDINGS**

LOW INITIAL COST — NO MAINTENANCE CHARGES

am interested in:

- ☐ COVERED CATTLE YARDS
- ☐ HAY BARNS
- ☐ COWSHEDS
- ☐ MILKING PARLOURS
- ☐ SILAGE BUILDINGS
- ☐ STORES
- ☐ GENERAL PURPOSE

A/11.

Please send full literature for AGRECON BUILDINGS.

Please ask representative to call.

(Tick where applicable)

Name .....

Address .....

.....

.....Phone No.....

POST TODAY to: **CONCRETE UTILITIES LTD., DEPT. A/11, WARE, HERTS,** or to any of our works, quoting reference letters.

WORKS AT WARE, LIVERPOOL, CRAMLINGTON NEW TOWN, COLEFORD, (GLOUCS).

LIVERPOOL Kirkby Industrial Estate. Simonswood 2887/8.

NEWCASTLE Cramlington New Town. Cramlington 272.

COLEFORD Broadwell, nr Coleford, Gloucs. Coleford 3369.

Agriculture

VOLUME 72 · NUMBER 11 · NOVEMBER 1965

Editorial Offices
Ministry of Agriculture, Fisheries and Food
Whitehall Place, London S.W.1. Trafalgar 7711

CONTENTS

One of these is printed for you and your farm

Now Fisons have prepared a separate recommendation book for every farming area

What does this mean? Simply, that Fisons have drawn on their wide national research and the intimate local knowledge of their Technical Representatives to compile a special recommendation book for every farming area. *Each is the most accurate and realistic set of recommendations farmers have ever received.* And any day now one of these will come through your letterbox.

How does it help you? First of all it makes everything simpler. It isn't a national recommendation book. The book is built around the needs of your locality and your farm. And you'll seldom find it necessary, whatever you grow, to use more than two or three different Fisons fertilizers for *all* your crops! That's a saving in storing, handling and ordering.

But because your soil, climate and type of farming are taken into account, the few compounds you do use are still the most perfectly fitted to the crops on your farm.

Fisons know very well that the money you spend on fertilizers is a careful investment which must show the highest possible return. The recommendations in your book do exactly this. *No plant foods are squandered! No money is wasted!*

Any day now the new book for your area will be in your hands. We believe you'll recognise these local recommendations, for your particular type of farming, as a simple and sure guide to making the most profitable use of fertilizers.

Footnote: If by chance you're not on Fisons mailing list you can get the Recommendation Book for your area from your local Fisons Merchant or Technical Representative. Or write direct to Fisons.

Save Those Calves!

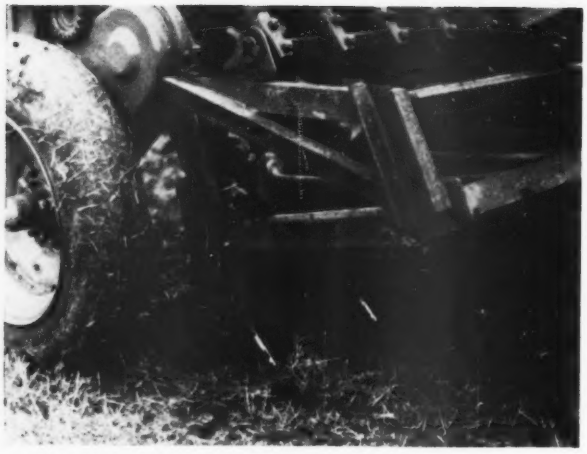
WE can only guess at the number of calves which are being lost each year in the early stages of rearing. The National Farmers' Union believes the number may well be 400,000. If these casualties are worth £10 each on average, there is an annual loss to the industry of £4 million. If a large proportion of these missing calves are of beef potential, the loss is nearly twice as great.

It is true that calf diseases are widespread and that salmonella, in particular, is now almost endemic in some districts. But thousands of calves die every year from bacterial and virus infections only because their natural resistance to disease has been undermined by bad management. Purchased calves are particularly susceptible in this respect. A calf is at risk as soon as it is born and that risk must increase as soon as it leaves home. An adequate ration of colostrum and a reasonable amount of care in rearing is usually sufficient protection for the home-reared calf.

The bought calf is under stress immediately it leaves home. It may be loaded too soon after a meal and spend hours in a draughty market or an equally draughty cattle wagon. It may face extremes of temperature within the space of a few hours. It is liable to be mixed with calves from other farms and meet a wide variety of unfamiliar pathogenic bacteria. The colostrum it received at home will provide little immunity if it is challenged when under stress.

Buyers of calves should ensure that only healthy calves are bought, and all new purchases should be penned singly on arrival. The calves should not be dosed indiscriminately with antibiotics nor subjected to a range in temperature of more than 10°F. Supplementary heat should be available in cases of emergency, and milk or milk substitute, though not warm water, should be rationed severely. An overdose of food to a travel-weary calf can be as lethal as lead paint.

F. J. WILLIS



Slit seeder coulter without discs

Pipedream or possibility?

Minimum Cultivations for Cereals

J. E. Whybrew

TRADITION is based on knowledge painstakingly gathered and carefully cherished over the years. It forms a sound basis for many of society's activities, but progress is not brought about by traditional thinking. It is the innovators and the awkward questioners that often create the climate for the conception and acceptance of new ideas.

The plough has been used as a prime cultivation tool ever since mankind learned to tame animals and train them to carry out his wishes. The Saxons had their ploughs, and the first agricultural statistician, William the Conqueror, listed the numbers of plough teams in each parish in the Domesday Book. Since those days, plough design has altered slowly but it has not yet been replaced by any other form of prime cultivator. Why has this slow and laborious process held sway over the arable farming scene for so long? The usual reasons given are that it inverts the soil, it breaks up pans and compacted layers, it controls weeds, it provides optimum conditions for plant growth, it is a convenient way of incorporating humus into the soil, and it is the only way of breaking up grass when it comes into arable cropping. It is also said to be helpful in the control of disease by burying crop residues.

Are these reasons valid in the context of present-day farming? After all, new developments in varieties, or changes in manurial practice, are quickly adopted. In fact many knowledgeable and progressive farmers are prepared to try new ideas before they have been fully tested if they can see a reasonable chance of success. Ploughing and the necessary after cultivations account for approximately fourteen per cent of the costs of growing a cereal crop. Any direct saving of costs by the elimination of ploughing is therefore likely to be small, but this is not the only consideration.

Ploughing is only the first operation in the production of a seedbed. Other operations have to be carried out to reduce the large soil masses, produced by ploughing in the first place, to smaller particles among which the seed can germinate and grow successfully. In other words, the harm done by ploughing has to be undone by further cultivations. There are few soil types where seeding can follow directly after ploughing. In most cases further operations with cultivators or harrows are necessary. On clay soils a considerable interval of time is often needed to allow the action of weather to exert its influence on hard and extremely intractable masses of soil before any cultivations whatsoever will break down the clods. This inevitably means a delay of four to six weeks between ploughing and drilling. Such a delay in the autumn may lead to long working hours, often overtime, so that the seed can be sown before worsening soil conditions make drilling impossible.

Weed control

There seems no reason why soil should be inverted; cereals can be grown successfully where the soil has only been cultivated, as was shown by trials on ploughing depths conducted on the Ministry's Experimental Husbandry Farms a few years ago. The weed control aspect of ploughing became less important with the discovery of growth-regulating compounds, and today it is considerably cheaper to use hormone weed-killers such as MCPA for controlling broad-leaved weeds than to rely on cultivations to do the same job. Grassy weeds are a different matter, but even here great strides have been made with the discovery of chemicals for the control of wild oats and blackgrass in cereal crops. Perhaps it is not too much to hope that, in the not-so-distant future, chemicals suitable for the destruction of couch and creeping bent in cereal crops will become available.

In the days of limited power, the provision of 'water furrows' on heavy land was necessary, but under present circumstances, tile draining and mole draining on suitable soils and subsoiling on lighter soils are all that is needed, apart from clean ditches, to avoid any trouble from waterlogging. The need for incorporating humus into the soil has always been considered important since, in addition to its manurial value, it possesses the most valuable property of stabilizing soil structure. However, work in Northern Ireland on the mulching of black currants has shown that soil structure can be maintained satisfactorily without cultivations or the incorporation of humus in the soil.

The most important function of ploughing and the subsequent cultivations has been to enable the farmer to sow his seed in a weed-free environment, thus allowing the crop to germinate without having to compete with established weeds. Until recently, no alternative method was forthcoming, but in the last decade some work has been done using chemicals such as

dalapon or aminotriazole as substitutes for ploughing. The results under good conditions were promising, but many of the chemicals remained active for a long time in the soil and were potential causes of trouble in subsequent crops. The introduction of non-selective non-persistent herbicides, such as diquat and latterly paraquat, has altered the situation. Both are rapidly absorbed by plants, and kill rapidly, but their biggest asset is the fact that on the majority of soils the chemical is immediately adsorbed by the clay fraction and is made unavailable to the roots of plants. Thus the great problem of competition from established weeds in the early stages of the crop, when it is most vulnerable, can be now eliminated without the need for ploughing.

Benefits

The possible benefits from a limited- or no-cultivation regime for cereal growing would appear to be: elimination of the delay between ploughing and seeding, which means that crops can be sown under conditions more nearly approaching the optimum—this may be important for winter-sown corn after a late harvest; little or no moisture loss through the operations of ploughs, harrows or cultivators; and the retention of crop residues in the upper layers of the soil instead of spreading them thinly throughout plough depth. A further advantage is that weed control may be eased through the fact that cultivation of the top two inches of soil will leave many weed seeds undisturbed in the lower layers and will not encourage them to germinate.

The first essential for the direct seeding of cereals is to ensure a clean seedbed. This can be done by spraying with paraquat if necessary; it is absolutely essential when starting from a ley. The seed and fertilizer is then introduced into intimate contact with the soil. Two methods have been tested recently, both avoiding any deep disturbance of the soil. The first method involves broadcasting the seed and fertilizer on the surface and then covering it with a thin layer of soil, either by the cutting and throwing action of angled discs or by rotary cultivation of the soil. The second approach is to devise some means of cutting a slit in the soil and at the same time

The 'Fernhurst' slit seeder working in a rotavated seedbed

A mounted disker seeder used in the preliminary trials in 1963–64

sowing the seed and fertilizer. In this case, little covering of the seed is possible, but it does not seem important so long as the seed is out of reach of birds and is in reasonably close contact with the soil.

Further investigations needed

Preliminary trials which were carried out at five Experimental Husbandry Farms in 1963–1964 and were designed mainly to test various types of machines thought suitable for direct drilling, gave encouraging results over a wide range of soil types. They also showed, however, that a great deal of further work is needed on the husbandry requirements of the technique and also on the design of suitable machinery. As a result of the trials in 1964, long-term work was started at the five Experimental Husbandry Farms last autumn to investigate some of the husbandry problems involved. The results at the time of writing are not yet available but difficulties were encountered at seeding time on three farms. Most of the trouble seemed to be associated with the very dry conditions prevailing last autumn. For instance, at Boxworth last year the very dry hot summer left the soil, a heavy boulder clay, baked out and hard. Ploughing was difficult and drilling was impossible until considerable work with heavy disc harrows and tined harrows had produced some semblance of a tilth. Under such conditions, therefore, it was not surprising that direct drilling of a paraquat-treated sward gave poor results. The experience certainly high-lighted the limitations of the system when tested under extreme conditions. If 'no-cultivation' techniques are used exclusively, the related problems of soil compaction and loss of structure may become increasingly important.

Many agriculturists, familiar with tropical conditions, know how rapidly good virgin soils, containing large amounts of humus, deteriorate following the removal of the forest canopy and their conversion to agricultural use with all the cultivation processes involved. However, in the situation of cereal growing without soil disturbance there seems to be the real possibility of a build-up of humus in a thin layer of top soil, since crop residues are not disturbed and remain in the top two or three inches of soil.

Unresolved problems

At present these two problems, soil compaction and loss of structure, are unresolved; but present experience suggests that they may not be so serious as one is sometimes led to believe. Certainly the presence of large amounts of humus in the soil can help to reduce the severe compacting and eroding effects of heavy rain by acting as a 'shock absorber' and by preventing the formation of any cap. Workers at Jealotts Hill Research Station have not observed any deterioration in soil structure following direct drilling for at least four years in succession on a soil type which is prone to rapid loss of structure under arable cropping, following normal cultivation methods.

In view of the poor results obtained on certain soil types under exceptional weather conditions last autumn, what is the future for cereal growing without ploughing? Better machinery design will help to solve the problem of penetration so that seed may be sown in the correct place; cage wheels or even 'hover' combine harvesters may eliminate the compaction bogy. It may be that the British genius for compromise will assert itself, and that the accepted regime for cereal growing will be to start a cropping sequence by ploughing or 'busting' and to continue with direct drilling until such time as it becomes necessary to loosen-up the soil again. Whatever the outcome, it seems certain that much work remains to be done before the old familiar plough is replaced entirely by the man in the white overalls and a spraying machine.

J. E. Whybrew, M.A.(Cantab.), has been a member of the technical staff at the Ministry's Boxworth Experimental Husbandry Farm since 1956. He was previously at the Norfolk Agricultural Station, Sprowston.

AT THE FARMER'S SERVICE

The 1965 edition of *At the Farmer's Service* is now available. This handy little book of reference contains information on the grants and subsidies obtainable for agriculture, horticulture and forestry, and brief descriptions of the Ministry's various services, such as the Agricultural Land Service, the National Agricultural Advisory Service, veterinary services and pest control. It also contains lists of addresses of the Ministry's regional organization, including County Agricultural Executive Committees, Experimental Husbandry Farms and Horticulture Stations and Divisional Offices. The addresses of other organizations which can be of help to the farmer—such as the Meteorological Offices and the various marketing boards—are also listed.

The booklet is free and can be obtained from the Ministry of Agriculture, Fisheries and Food (Publications), Tolcarne Drive, Pinner, Middlesex, or from any of the Ministry's Divisional Offices.

A subsequent article will consider how workshops can be adapted to meet their changed purposes

H. J. Hine

Farm Workshops Today—

changes in their purpose

In some respects there is less need for a workshop on a farm than there was a few years ago. But paradoxically in other ways the need for a workshop is greater than ever before, even though its purposes may have changed and the type of equipment needed in it may be different.

The design and construction of farm machinery have both improved in recent years, and so have the repair facilities provided by the dealers. Implements are more reliable than they used to be, and mobile workshops, kept in communication by radio, enable dealers to respond more quickly to calls for service. The time spent on actual repair work by dealers has been reduced by the development of equipment designed specifically for dismantling and re-assembling particular makes of machinery.

Component replacement

Another factor influencing workshop requirement is the tendency for some of the more complicated farm machinery to be constructed as a group

of components. Individual components which develop a fault or become worn out can be replaced by reconditioned units obtained on an exchange basis. Thus an intricate farm-repair of the component may not be necessary and indeed may not be economic. All that is needed is a fairly simple job of fitting. The replacement system has been helped by the rationalization of design that has been proceeding quickly in recent years, particularly in the case of tractors and engines.

Some of the factors which affect the justification for a given kind of workshop are very indirect. One factor which can influence decisions upon how much overhaul work is worth while before an implement is disposed of is the incidence of income tax allowance on the purchase of new machinery. Another factor is the amalgamation of farms into larger business units, since these provide worthwhile opportunities for utilizing a considerable number of one make and type of tractor or implement and can have a central workshop equipped with tools special to that make. It is worth noting, however, that this concentration as to makes and types can bring better service from the dealer and may thus reduce the need for repair facilities within the farm.

Construction of equipment on the farm

There has been an increase in the kind of farm and estate equipment lending itself to home fabrication, e.g., potato-handling boxes, concrete yards and roads. The manufacture of equipment must be done in a properly-equipped workshop of the right size. Estate work must also have a good building from which constructional expeditions can set out. The recent developments in simple and cheap power-driven tools have made many of these jobs more attractive than they used to be.

Improvements in the design of implements and machines have led to some simplification in maintenance tasks—particularly lubrication and prevention of corrosion. These simplifications are, however, less significant in maintenance work than in repair work, and care must be taken to make sure that the continuing need for full maintenance facilities is not overlooked when workshops are being replanned. Tighter farm management schedules demand that there shall be no long delays due to breakdown of machinery at critical times. Although facilities for immediate running repairs, with or without reliance on the implement dealer, are one form of insurance against long delays, there is much to be said for the part that regular maintenance can play in averting the breakdowns altogether.

An overriding reason for external maintenance and repair facilities may be the small margin in workers' time that goes with efficient mechanization, but this applies perhaps more to certain livestock enterprises than it does to arable work. A large beef enterprise is unlikely to have enough workers available to feed the cattle and clean the houses by hand when the mechanical installation has broken down. Labour demands on more diversified farms may be more variable and, indeed, time spent in the workshop or in tasks based on it may be a help to maintaining a more even level of labour demand. Farm workers must not be hampered by secondary tasks at times of peak demand in field or barn. Much of the time to be spent on machinery repair and some of the time to be spent on machinery maintenance can, however, be done at off-peak times. Moreover, the provision of a weathertight and well-warmed workshop can make it possible for useful constructional jobs to be done when farmer and workers are kept out of the fields by rain or frost.

Size of workshop

A large building is needed if daily maintenance tasks are to be carried on inside it. This is expensive in first cost and in heating, but the tasks will be done better when they are performed away from dust and damp. It is likely also that they will be done more regularly, because it is pleasanter to work inside a sound building than in a yard or open-sided implement shed on a winter's day. The same line of thought applies to small repairs; they will be attempted sooner and carried out better if the machine can be brought indoors. The workshop can save on the capital costs of the machinery as well as on the running costs, because good maintenance and timely running repairs prolong the life of a machine. Provided the machines were well chosen when they were purchased, so that they do not become obsolete too soon or are not made redundant by changes in the farming policy, the prolonged life can reduce the level of capital cost.

Although it is well for the building to be large, the equipment need not be elaborate. The law of diminishing returns applies to workshop equipment as surely as it applies to fertilizers. A good bench, a basic range of spanners, and some drills and saws can bring very great saving in machinery upkeep costs. But when the equipment is extended to include the tools for advanced engineering, we do not get the same direct return for purchase money as we did from the elementary tools, unless the farm is large enough for the capital value of the implements and machinery to justify a full-time mechanic. In the latter case, it pays to have the workshop very well equipped indeed, otherwise full use will not be made of the mechanic's skill.

All in all, it may be that on many farms a fresh look should be directed at the function of the workshop. Although there can be no doubt about the increasing need to make maintenance work easy and comfortable, a close look may cast doubt on the wisdom of setting up new overhaul facilities and even of continuing to use existing ones.

H. J. Hine is a member of Jesus College, Cambridge, and is engaged on research into the principles of ploughing. Previously he was in the National Agricultural Advisory Service, joining the N.A.A.S. Liaison Unit at the National Institute of Agricultural Engineering, Silsoe, in 1950 and becoming Eastern Regional Mechanization Adviser in 1956.

Typical 'Roadnight' pig-rearing system

Outdoor Pig Rearing by the 'Roadnight' System in N. E. Scotland

R. Blair and I. M. Reid

THE system of outdoor pig rearing which was devised by Richard Roadnight, who farms 2,000 acres at Britwell Salome, near Oxford, was introduced to the district surrounding Aberdeen within the last ten years. At present about twenty farmers in the district are known to be operating the system. The adoption of such a system of pig rearing in this area is interesting for two reasons. First it is a reversal of the current trend towards intensive systems of animal production, and second, outdoor rearing might not be expected to succeed in the rigorous climate of North-East Scotland.

To obtain some measures of the efficiency of weaner production by this system we conducted a survey in 1963 with the help of the Pig Industry Development Authority and the farmers concerned. The survey covered nine farms on which the 'Roadnight' system had been adopted (and adequate records kept) and nine comparable farms on which rearing was by a conventional system.

The 'Roadnight' system

Groups of sows are batch farrowed twice yearly during March and September in small individual wooden arks on pasture. A typical 'Roadnight'

unit can be seen in the illustration at the head of this article; the arks are spaced so that there are about 2–3 per acre. The creep-feeding and watering arrangements are shown in the photograph on p. 532.

The piglets remain with their dams up to the age of eight weeks when they are disposed of as weaners or are transferred to a fattening house. At this time the sows are dried off, re-mated and kept outside in larger communal arks until the next farrowing.

Generally only cross-bred sows are used for the system. The most usual cross is between the Wessex Saddleback and the Large White or Landrace. This cross is believed to combine the traditional hardiness and mothering ability of the Wessex Saddleback with the better carcass characteristics of the latter breeds.

The sow feed is generally a proprietary compound in either cube or nut form, which is more suitable than a meal for feeding to stock on pasture. Creep-feed is generally in pellet form and is given to the young pigs from the age of 2–3 weeks in covered feeders. Provision of drinking water has been made easy by the availability of cheap alkathene tubing, which has the advantage that the water system rarely freezes.

Survey findings

Some figures indicating the physical and economic efficiency of the two systems are given in Tables 1 and 2. Weaner production by the 'Roadnight'

Table 1

Efficiency of weaner production by the 'Roadnight' and by a conventional pig-rearing system

	'Roadnight'	Conventional
Feed used:		
Meal/sow/year (cwt)	22·5	25·5
Skimmed milk/sow/year (gal)	0·0	91·0
Labour needed:		
Man hours/sow/year	18·2	35·8
Veterinary attention needed:		
Calls/10 sows/year	0·9	8·2
Weaners produced:		
Litters/sow/year	2·0	1·9
Piglets weaned/sow/year	17·4	16·7
Piglet weight at 8 weeks (lb)	44·1	38·5

Table 2

Direct costs involved in the 'Roadnight' and in a conventional pig-rearing system

	'Roadnight'	Conventional
	£	£
Meal cost/sow/year	36·4	36·2
Skimmed milk cost/sow/year	0·0	1·9
Labour cost/sow/year	4·6	9·0
Veterinary charges/sow/year	0·1	0·8
Total direct cost/sow/year	41·1	47·9
Pigs weaned/sow/year	17·4	16·7
Cost per weaner*	£2·4	£2·9
Cost per lb of weaner (shillings)	1·1*s.*	1·5*s.*

*Excluding cost of creep-feed, land use and building use.

Creep-feeding and watering arrangements

system appears to be more efficient and cheaper than production by a conventional system. Sows on the 'Roadnight' system produced two litters of heavier piglets per year; the slightly smaller number on the conventional system appears often to be due to difficulty in getting sows to conceive in the late autumn in the north-east of Scotland, whether on concrete or on grass.

We were unable adequately to compare the economic efficiency of the two systems as information on capital invested in land, buildings and stock, and on the amount of creep-feed used was not available. Nevertheless, labour costs and costs of veterinary services were appreciably lower in the 'Roadnight' system and at an average building cost of £9 10*s.* per ark the housing costs must have been lower also.

Total feed costs were only slightly lower on the 'Roadnight' system. Although the amount of feed used was considerably less, the increased cost per ton of feed reduced the savings on the 'Roadnight' system. Cheaper home-mixed meals of the type used in the conventional system are unsuitable for feeding to sows on pasture, and instead cubes have to be used.

Sows on the 'Roadnight' system weaned slightly more and heavier pigs per year at a lower total cost (ignoring any differences in land-use and building-use costs) than sows on the conventional system. As a result there was a saving of 10*s.* per weaner or, expressed in another way, of 5*d.* per lb of weaner.

Conclusions

The 'Roadnight' system of outdoor pig rearing is, on a *per sow* basis, slightly more efficient than a conventional system of rearing in the north-east of Scotland. It also produces heavier, and probably healthier, weaners more cheaply. However, since only about 2–3 sows can be accommodated per acre, it follows that intensive methods of production would allow a greater number of sows to be kept and more weaners to be produced. More arks would have to be housed per acre before the 'Roadnight' system could commend itself for large-scale pig production.

Another great drawback of the system as it is now practised is that its large-scale adoption would result in a great concentration of weaners at

two periods in the year. This would lead to marketing difficulties since the basis of pig contracting is continuity of supply. The need to cope with widely fluctuating numbers would also not make the best use of fattening accommodation. It might be that the seasonality of the 'Roadnight' system has been overstressed and that more regular farrowings could be attempted. Such a move might not be altogether doomed to disaster since it has been shown that outdoor early weaning at three weeks can be successful in even the severest weather.

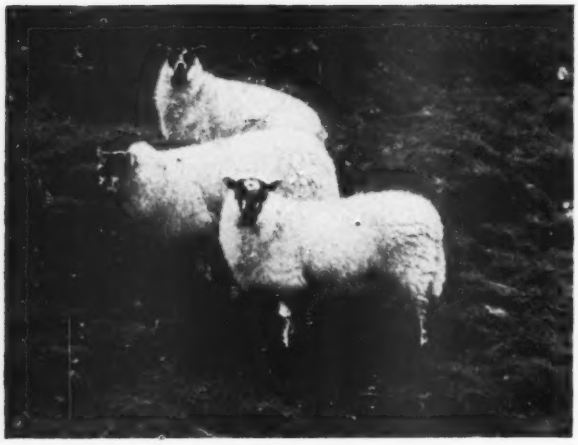
Other drawbacks of the system are the need for suitable well-drained land on which to site the arks, the need to purchase more expensive proprietary feeds and the Wessex blood in the weaners which might make them unsuitable for the bacon trade. We were unable to obtain grading information on these pigs since the majority of weaners were sold off the farms. However, most of the weaners produced were back-crosses to the Large White or Landrace and so were probably quite suitable for the bacon trade. Furthermore, Wessex crossing is not essential as at least one farm used Landrace x Large White sows successfully. The finding of some research workers that piglets reared outdoors are better than those reared indoors suggests that pigs produced by the 'Roadnight' system might even be superior to other pigs.

Cheap feed mixtures for the sows and piglets could be obtained by group trading and co-operation with a mill for cubing, and by the use of home-grown grain in the rations. We understand that such a move is intended by at least some of the farmers practising the system.

Our survey was limited in size and scope, but from our findings and observations it would appear that the 'Roadnight' system of weaner production has little to offer the farmer wishing to produce pigs as a main enterprise. Such an enterprise would demand intensive conditions. The 'Roadnight' system might, however, appeal to the small farmer with limited capital and with land that could not be used more profitably for cropping or for other purposes.

Robert Blair, B.Sc. Agric.(Hons.), Ph.D., is Senior Research Fellow at the School of Agriculture, Aberdeen University, and is engaged on research into pig nutrition. He was previously at the Rowett Research Institute, where he did similar work.

His co-author, **Ian Maitland Reid, B.Sc. Agric., M.N.S.(Cornell),** is a Research Fellow at the Graduate School of Nutrition, Cornell University, New York, U.S.A.



Ewe lambs, uniform in type and quality –the result of a careful breeding policy

Spare-time Sheep Farmers

A. W. Prowel

ANYONE who has been associated with the land for any length of time can call to mind men who started with few acres and very little capital, and who now farm on a substantial scale. Many men have started in the same way and have yet remained small farmers. But there is also another category of farmer: the spare-time man, who returns home in the evenings and at week-ends to do his farming. It is interesting to speculate about his motives. Is it love of livestock and the land, or ambition to one day become a full-time farmer, or is there some other reason? Some men are not content unless they actively occupy every hour of the day.

Recently I set out to meet and talk to some of these men. Most of them were seen in the evenings, when their regular daily work was over. One thing about them all struck me forcibly, and that was their sense of perspective with regard to their farming activities. Being away from the farm for much of the time had endowed them with the capacity for looking clearly and objectively at the enterprise. None was a stranger to farming, and in no instance was there any illusions as to what he was about. Each was a realist and had already formed his plan for the future; and decided what he wished to attain and the feasibility of doing it. Meeting these men was a most refreshing experience.

Neighbours and the family

Being away from home for much of the day or, in the case of one of these sheep farmers, much of the week, meant that there was need for

someone to be available to cast his or her eye over the stock from time to time, and also to make some arrangements to deal with peak labour requirements. The family figured very prominently here; wives, brothers and sons all were involved to a greater or lesser degree. At lambing times, wives were often as adept as husbands in tending the flock.

The old saying that 'good fences make good neighbours' held a special significance for each of the three part-time farmers visited. All stressed the need for being able to contain the flock and also to know where the sheep were at any given time. On each farm, fencing was one of the biggest items of expenditure. The feeling one had of good-neighbourly relationships was borne out by the degree of co-operation which existed between these men and other farmers in the locality.

Edward Price of Llangynidr in Breconshire is a case in point. Apart from the usual hand tools, he has no tractor or implements and has no intention of buying them unless they could be fully and productively employed. A few years ago, middle-aged Edward Price was a regular farm worker until an accident laid him off work. During his stay in hospital, which was rather a long one, he had plenty of opportunity to think and, whilst recuperating, he made the decision not to go back to his old job, but to try something else. He now works for British Waterways on the old Newport to Brecon Canal, and also farms on a spare-time basis 26 acres of land together with some open hill grazing rights. The ewes are on the open hill for most of the year. In July the more forward wether lambs are weaned and finished at home on aftermath. How does the hay get mown and the occasional field get ploughed and reseeded? The answer is that Edward Price and his sons help the neighbours on occasions and they reciprocate by helping with jobs which require the use of machinery.

Eighty hardy Welsh breeding ewes are kept, and whilst this spare-time occupation makes a useful contribution to the regular pay packet, I gained the impression that this was far from being the prime motive. To have some stock of one's own and to be in close touch with the land was rewarding in itself.

Upland sheep country

With land values at their present level, it was to be expected that these sheepmen would be found mainly in the uplands. This was so with David Hardwicke, farming at Upper Caeglas, Llanbister, a sparsely-populated area in north-east Radnorshire, where there are at least 15 sheep to every human being. David Hardwicke is a young man, an owner-occupier, and farms 116 acres of enclosed land which adjoins open hill grazing rights. A target has already been fixed for the farm, and annually blocks of 16 to 17 acres are being ploughed and reseeded under rape. At Upper Caeglas, good stockproof fences are top priority.

A programme for the farm for the next few years has already been worked out in consultation with the District Advisory Officer. The emphasis has been on fencing, fertilizers, reseeding and specialization. Lime and fertilizer spreading is done under contract. There is a secondhand tractor, but this is used for all those odd jobs to be found on a farm of this size. At present, the programme is conditioned to the fact that David Hardwicke's main occupation is as the leader of a small group of men employed doing contract work, such as repairs to farm buildings, farm fencing and, during the

summer, contract shearing in southern England as well as in Wales. The nature of this work is such that, during lambing and other peak labour periods, David is able to take time off to attend to the needs of his sheep. At other times, David's brothers, who live nearby, keep in close touch with the farm.

The sheep flock is quite sizeable already, but the target is at least a 40 per cent increase in numbers, which will bring the grand total to about 700 sheep; 400 of these will be white-faced hill-type ewes, 200 will be speckled-face ewes occupying the inbye farmed land, and 100 will be white-faced shearlings which will summer on the hill.

Bulk fodder in the form of hay is bought in and this, together with purchased concentrates, is the winter feed. On farms of this type low fixed costs and attention to margin over feed costs are important factors in determining profitability, and the main variable costs on average, would be:

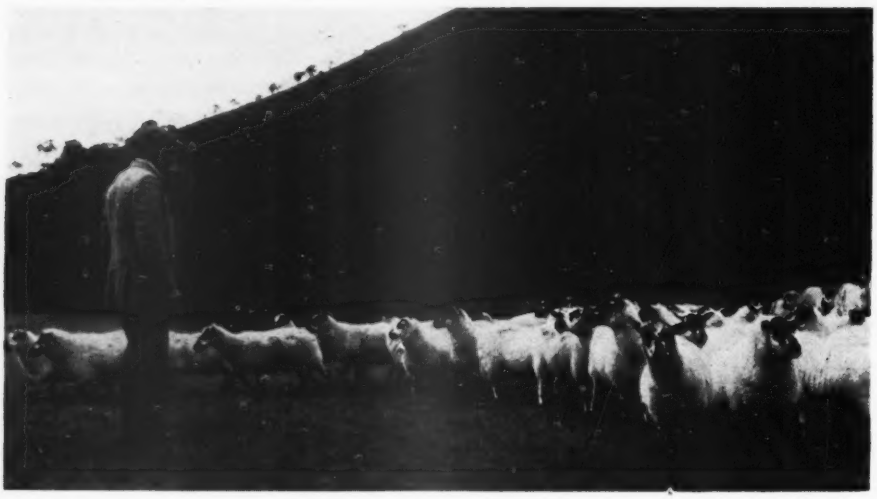
Per Ewe	£	*s.*	*d.*
Hay ($\frac{1}{2}$–$\frac{3}{4}$ cwt)		9	0
Purchased concentrates (12 lb)		3	0
Ewe replacement		12	6
Fertilizers and seeds		8	0
Veterinary attention and products		5	0
	1	17	6

David Hardwicke is a first-class stockman who understands his sheep and is clearly making a success of his farm.

Making full use of the land

Profitability in traditional systems of sheep production is a problem not only on the medium or large farm, but applies especially to the smaller-than-average sheep farm. Gwyn Jones of Upper Cwm, a small Forestry Commission farm in North Breconshire, is keenly aware of this, and although

Gwyn Jones casts a critical eye over some ewes and ewe lambs for flock retention



he works full time for the Forestry Commission, he has not simply been content to occupy land as a hobby. He is keen, and like the others, has a sound business head. Although he has ideas for the future, he is content for the present to maximize intensity and profit on his small farm. He looks forward to acquiring more land, if this becomes possible, sometime in the future when circumstances and opportunities present themselves. Starting off here in 1961 with 32 ewes, the flock has grown to over 160 breeding ewes. On 34 acres and some adjoining hill grazing, this works out at between 4 and 5 ewes per adjusted acre. The Beulah Speckleface flock is a credit to the owner.

Apart from a van which conveys him to work, Gwyn Jones has no time for unproductive machinery; he manages with the usual farm tools and a wheelbarrow. Management operates on a high level; husbandry and management problems are usually discussed with the N.A.A.S. adviser as completely inter-related aspects of his farming enterprise. The net farm income at present represents a return of 35 per cent on capital. In the interest of good pasture management, it now seems that a secondhand tractor and mower will have to be purchased for topping over the grass. Otherwise no additional capital expenditure on equipment is contemplated.

At present a small acreage of rape and a few acres of turnips are grown, but these are incidental to the reseeding programme. No fodder is conserved, and winter feed for the ewes is purchased. Ewes receive whole maize in the winter; depending on body condition and the severity of the winter, the feeding programme starts with a few ounces and builds up to about $\frac{3}{4}$ lb per day by the middle of April, when hand feeding normally ceases. With continually increasing density, the main problem for the future will be finishing the lambs. Perhaps indoor feeding will be tried, but this is something which Gwyn Jones will solve in his usual way.

The future

The spare-time farmers I have mentioned are all aware of their limitations of capital and acres; they all have certain objectives which can be reasonably attained. They are not unique—there are many such men scattered throughout the countryside. Motives and methods differ, and in an era of amalgamation many small farmers will inevitably leave their farms. Will there still be a place in the future for men like Edward Price, David Hardwicke and Gwyn Jones, who are not only dedicated to farming but also have the brand of determination which is very difficult to be denied?

A. W. Prowel, N.D.A., is County Advisory Officer for Brecon and Radnor in the National Agricultural Advisory Service. A frequent contributor to a number of farming journals, he has had many years' experience in advisory work relating to livestock rearing, cattle and sheep production, land reclamation and farm management.

FROM THE ALS

G. A. YOUNG

Agricultural Land Service, Preston

Short-life Buildings

A small group of Agricultural Land Service officers has recently been considering the possible technical and economic advantages of short-life, low-cost buildings for farms. The high cost of providing buildings and the speed with which agricultural practice changes have created a problem for the owner. In the August 1964 edition of *Agriculture*, Mr. J. S. Nix wrote on 'The Dangers of Over-capitalization'. In this article he drew attention to the limitations which can often be imposed on the standard of management by capital being tied up in fixed equipment which is often virtually untried and may have to be modified within a short period—certainly before the money expended has been replaced from increased profit. There is a strong case for erecting buildings less substantial than those in current use but of such low cost that the capital can be written off over a very short period, say of five years. After this the building can be regarded as obsolete and be replaced with one in keeping with the changing farm system and needs. The problem is how to achieve this aim.

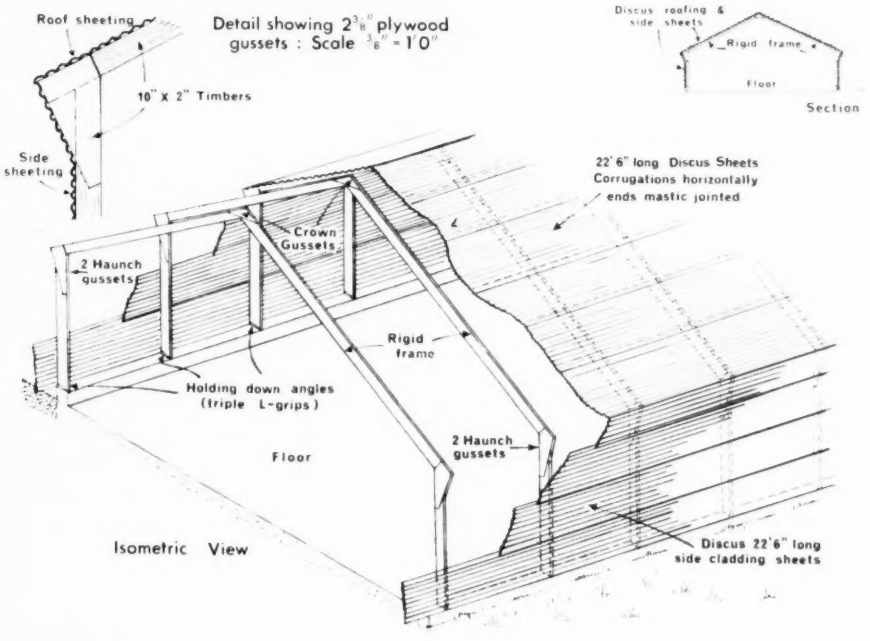
Short-life materials

Most farm buildings now being erected are formed of a framed structure made of timber, steel or concrete, to which a variety of claddings can be added. The most common materials for cladding roofs are sheets of asbestos-cement and corrugated steel, and these can also be used for forming the walls of storage buildings. They are in no sense short-life materials, and even in areas subject to air pollution, both claddings have lasted for many years. It is indeed difficult to find any rigid material which conforms strictly to the definition of short-life, and manufacturers would be very unhappy to have their products so classified. There is the possibility of using a light plastic sheeting such as polythene, and this can be successful, on a light framework, for a very short period of six months or a year. This is a field in which great advances are being made, and if a reinforced fabric can be produced at low cost it may be suitable for covering storage and working areas. So far, the expense of plastic structures and the limitation in their

use makes them impracticable. The need is not really for a short-life building which will be physically worn out after five years, but for a building cheap enough to enable capital to be repaid in that time.

Low-cost structures

Various combinations of frames and cladding materials have been examined. Corrugated steel is the most adaptable material, and it is possible to devise a system in which the sheets are carried directly on the frames, without the use of purlins. This can be achieved by using long sheets of high tensile steel. The spans would be limited to about 40 ft and frames would have to be at 7 ft 6 in. centres. (See diagram below). Such a cladding on a timber frame could be erected by farm labour at about 4*s*. 8*d*. per square foot against the standard building of timber framework, normally

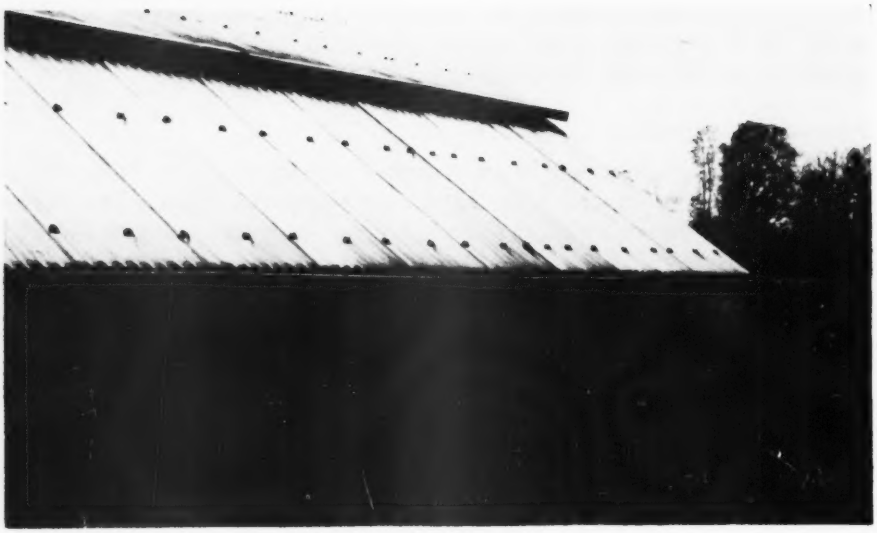


acceptable under the Farm Improvement Scheme, at 8*s*. 4*d*. per square foot. This can be compared with the pole barn, illustrated in Fixed Equipment of the Farm Leaflet No. 45, which costs about 4*s*. per square foot.

The use to which such a framework can be put is obviously limited. A good illustration of its practicability can be where grain is stored on the floor. The building can then consist of timber or steel prefabricated thrust walls and a waterproof concrete floor covered with the timber and corrugated steel roof structure. Grain could be stored to a depth of 6 ft in a building costing 12*s*. 6*d*. per square foot, or £5 4*s*. per ton of grain.

Stock buildings

It is only in buildings for simple storage that the use of this framework can effect a considerable saving. As soon as the building is required for



An unusual type of construction, based on the use of tensioned wire ropes

stock, and more sophisticated internal fittings have to be added, the reduction in cost becomes a very small proportion of the total. It is possible to reduce the cost of a loose-housing yard by between 30 and 40 per cent, but with a cowhouse the saving would only be about 12 per cent, and this saving could only be achieved by using materials which are often unsatisfactory, due to condensation and insulation difficulties. In fact, there are great disadvantages in using this cheaper construction in cowhouses. The answer may lie in the field of the cow kennel. Here the experiments which have been carried out show that housing costs can be reduced to a very low level, but so often the ancillary works, such as concrete aprons and yards, slurry tanks and parlours, can make the final saving very small indeed.

Removable buildings

Mention must be made of buildings which can be taken down and re-erected on a different site. These de-mountable buildings can be completely prefabricated or can be framed structures to which panels are added for roof and side walls. Both types are freely available throughout the country. Transport and erection costs can be heavy, but in the more remote areas, where building costs are high, these buildings can be competitive. It is the construction of the foundation that largely determines the feasibility of moving and adapting such buildings to another use. One manufacturer has produced a range of roof trusses which are adjustable in span within a 3 ft to 5 ft range, but generally speaking any amendment in the span width cannot be achieved economically. This is the greatest difficulty in erecting a building with the idea of making it adaptable. There are a number of new buildings on the market made of interlocking ribbed steel panels, which are virtually frameless. At present, the price of these keeps them out of consideration as low-cost buildings, but there is scope for a great deal of development in this field.

An unusual form of construction (illustrated opposite) is based on the use of tensioned wire ropes, in the form of a tent with centre poles. Corrugated steel panels are attached to the ropes to form the roof, which can go right down to ground level. This is only economic for spans of more than 60 ft and the cost per square foot becomes lower as the span increases. The principle is one which could be developed for cheaper farm buildings.

Financing short-life buildings

If a landlord erects a building for a tenant, he will expect to receive in return an annual sum which will repay his capital and give adequate interest on his outlay. The tenant will normally only be prepared to pay, out of his profit, the amount by which the building will increase the annual value of the holding. The amount required by the landlord to write off the capital over a short term (say five years) will often be more than a tenant is prepared to pay. Over a five-year period the landlord would need to charge 24 per cent a year to cover interest at 7 per cent and a sinking fund. This percentage reduces as the period of write off is lengthened. Over ten years it is 14 per cent, twenty years 9½ per cent and thirty years 8 per cent. If a landlord invests £1,000 on a short-life building and intends to write it off over five years, the annual charge would be £243. With the write-off period increased to thirty years, and the annual charge the same, the capital expenditure would be £2,600 for a more permanent type of construction. Usually, the short-life building will not durably increase the value of the holding, and landlords are more likely to erect the more expensive buildings for their tenants. Owner-occupiers are in a position to write off a much greater sum each year by reducing their profit margin for the shorter period, and they can more easily take advantage of these less permanent forms of construction.

The problem is twofold. First, of reducing cost of buildings, and secondly, of ensuring that the buildings erected will be adaptable to meet the varying needs of farm and farmer. No solution is offered, but it is felt that the provision by the landlord of covered areas, with large spans and a minimum of internal fittings, is the best course at present. The tenant should then be free to adapt the internal arrangements to meet his changing needs.

Research Spot

Plant Breeding in Wales

A. J. L. Lawrence

MODERN plant breeding calls for the integration of knowledge gained in a number of scientific disciplines. This is illustrated by the research projects described in the 1964 Report of the Welsh Plant Breeding Station, many of which involve the close working together of the several departments of the Station.

A new department, that of Developmental Genetics, has recently been added. This is equipped with extensive laboratories and glasshouses for combined physiological and biochemical studies of genetic variation in the response of forage plants to environmental conditions, particularly light and temperature. These laboratories are, very fittingly, named after the Station's first Director, Sir George Stapledon, whose pioneer work on grassland improvement is known throughout the world.

Herbage plants

The general aim in plant breeding is to develop strains which are more efficient in converting plant nutrients and solar energy into food, but with herbage plants, as the Report points out, the most efficient plant in these respects is not necessarily the most useful to the farmer. A variety for hill seeding, for example, must survive heavy grazing by sheep; this, and not the particular efficiency of plant types in terms of energetics, is the pre-requisite. To enable the hill land work to proceed on a critical basis, the Station has now established a Hill Land Station with excellent laboratory facilities at Pontydwr.

The feeding value of herbage plants is another important factor. Resistance to disease has also to be taken into account in assessing the value of breeding material. The effect of disease on a plant community is, however, not easily predictable. In the Plant Pathology section of the Report, work on clover phyllody virus is described which shows that the loss of infected plants from the sward because of attack by this virus may be made up by compensated growth by plants which have escaped infection.

The widespread use of herbage varieties by farmers depends largely on the extent to which the plant sets seed. Experimental work indicated that grazing perennial ryegrass in September improved the seed yield. However, the varieties reacted differently to the other managements imposed in the experiment, which were grazing at ear initiation and at three weeks after ear initiation.

Plant population and plant breeding

The characteristic complexity of field experimental work in plant breeding is illustrated by a study of the significance of seed size and weight in diploid and polyploid varieties of white clover. It was found that when plants are growing under closely-spaced conditions the relative yield differences between small, medium and large seeds apply only in the early part of the season. Once a leaf system capable of intercepting all available light is reached, the yields from swards of all seed sizes are the same. Similarly, in an experiment comparing the yields of oat varieties of erect and drooping leaf habit, there was some evidence that there may be a reversal in the comparative yield capacities of the two types of growth habit at different plant populations.

Hybrid derivatives obtained by crossing doubled pairs of S.22 Italian ryegrass and S.170 tall fescue were tested at the Station during 1964, to see how far certain desirable characteristics of the two parents were present in the new plants and how they reacted under different management conditions and manurial treatments. The results so far obtained suggest that the best of the hybrids show a yield advantage over S.22 for the year taken as a whole.

Some interesting studies are reported on pelleting trials with clover, and on strains of nodule bacteria suitable for inoculating legumes in swards which receive heavy applications of nitrogen and in which inoculation tends to be reduced. An interesting biochemical study of seed ripening in ryegrass in relation to time of harvesting is also included. Earlier harvesting appears to increase seed yield without materially affecting quality.

Cereals and other crops

The Report includes references to the effect of disease and leaf disposition on the yield of oats. An examination has also been made of Australian oat varieties, for which evidence as to their resistance to cereal root eelworm appears to be conflicting.

British types of field bean, it is pointed out, are not sufficiently self-fertile and their vigour is therefore reduced by inbreeding. Selections of both winter and spring beans are being made in the search for those which are self-fertile and have ability to self-trip and which are, therefore, likely to be of commercial value. The Report also refers to work on the breeding of rape and swedes for resistance towards fungal diseases.

Biochemical studies

In chemical studies some evidence has been obtained that, contrary to general belief, nitrogen and potash fertilizing does not depress the magnesium content of spring grass. Another interesting chemical study dealt with nitrate toxicity in sheep. This is due to the reduction of nitrate in fodder to nitrite when the fodder is ingested. It now appears that this reduction can take place in high-nitrogen hay before it is eaten when the hay is subject to adverse weather.

Copies of the 1964 Report of the Welsh Plant Breeding Station may be obtained, price 7*s.* 6*d.* (post free), from the Secretary, Welsh Plant Breeding Station, Plas Gogerddan, Aberystwyth.

Barley Growing in Devon

A. J. Brown

In pre-war days Devon, in common with many other counties, grew a small acreage of barley. Traditionally, the barley crop was confined mainly to the lighter soils in the low-rainfall areas; that is on the red soils of east and mid-Devon, and South Hams. These areas also tended to be near the sea, and the main object in growing barley was the hope of selling the grain at enhanced prices for malting. Barley was regarded by many farmers in the less favoured parts of the county as a crop for the conventional arable areas only.

The June returns show that in 1939, out of a total cereal acreage for the county of 134,947 acres, Devon grew only 21,273 acres of barley and 83,600 acres of oats.

Cereal Growing in Devon (acres)

	1939	1944	1954	1964
Barley	21,273	66,725	40,395	152,288
Wheat	22,901	78,759	19,698	10,027
Oats	83,600	117,451	52,749	12,880
Mixed corn and other cereals	7,173	34,300	55,562	6,857
Total	134,947	297,235	168,404	182,052

During 1944, when compulsory cropping was in force, the cereals grown in the county reached 297,235 acres, with 66,725 acres of barley. In the early fifties, as a result of plant breeders' efforts, new varieties capable of standing well and yielding good crops of corn became available. Since then the possibilities of barley as a crop for stock feeding purposes have been realized by an increasing number of farmers.

The above table shows how, in 1964, barley reached the biggest acreage to date, whilst the oat crop diminished. But undoubtedly the most important factor influencing the change in emphasis in this predominantly livestock county was a partial failure of the oat crop over a number of years. This

was partly because of attacks from frit fly and mildew, and partly for reasons not yet fully explained. This unreliability of the oat crop, when spring-sown, coupled with greatly improved barley varieties being offered with strong short straw and increased grain yields, giving a crop readily harvested by a combine harvester, led to a great interest in barley. Changed thinking about the feeding of ruminants has also led to increased interest in barley growing.

Early trials

Records of barley variety trials carried out in Devon in the late twenties and early thirties, under the auspices of the Agricultural Education Department of the County Council, show that in east Devon and the South Hams the barley crop was capable of giving yields in excess of 30 cwt of grain per acre. These grain yields were obtained with fertilizer at application rates per acre of about 1 cwt sulphate of ammonia, 3 cwt superphosphate and 2 cwt kainit, or in modern parlance 20N, 54P, 28K. The crop was usually taken as a third crop in the rotation after a period of ley. The normal rotation was wheat following ley, then turnips folded by sheep, followed by barley. The varieties being used at that time were Plumage Archer, Spratt Archer, Archer, Archer Goldthorpe, Millenium and Abed Prentice. The variety Archer Goldthorpe was to remain popular in south Devon for many years, including the war period.

Similarly, the earlier ripening and good malting qualities of Plumage Archer enabled it to continue as a popular variety in the more favoured parts where good malting samples could be grown fairly readily. It is of interest that, on some of the traditional barley-growing farms, the same variety continued to be grown without change of seed for many years. The non-importation of seed from other counties probably accounts for the low incidence of wild oats on some mainly arable farms growing considerable cereal acreages for a period of years. On one such farm known to the writer the same variety was grown for thirty years, and barley crops continued to be raised from home-grown seed until the early fifties.

Present-day growing

Although strict rotations are not now closely followed, very few farmers attempt continuous cereal growing; there may however be a series of three or even four successive barley crops. Yields tend to range between 30–35 cwt per acre in good average crops, but there may occasionally be greatly reduced yields because of laid crops, take-all, leaf blotch or severe mildew attack.

A cereal survey carried out in 1963–64 in one mid-Devon district, in a 35–40 in. rainfall belt, gave results which probably reflect the general position in the county as a whole. This survey, covering 1,500 acres of cereals, showed that 90 per cent of the cereal acreage was devoted to spring barley, and that 92 per cent of the barley acreage was occupied by the varieties Rika, Pallas, Proctor and Vada. On the remaining 8 per cent of barley area, the varieties grown were Carlsberg, Union, Maris Badger, Maris Baldric, Cambrinus and Swallow. Average yields of the varieties at a 15 per cent moisture level were:

Pallas	31 cwt per acre (range 25–40 cwt)
Proctor	30 cwt per acre (range 17–41 cwt)
Rika	30 cwt per acre
Vada	25 cwt per acre

The acreages of the other varieties were so small that yield figures may be unreliable. The survey also showed that, on 93 per cent of the acreage, fertilizer was combine drilled, using 30–36 units of phosphate and potash on shale and clay soils, and 30–40 units of each when broadcast.

Whilst the value of nitrogen in obtaining grain yield is appreciated, one of the great difficulties is to adjust the amount so that crops do not become laid early in the season. This has to be done in the light of the county's very varied summer rainfall and according to how soon after grass of varying quality the crop is grown. In the survey, the rate varied from 36 units of nitrogen when combine drilled, to only 26 units of nitrogen broadcast on the first crop after a ley is ploughed. Subsequent crops received 45–50 units of nitrogen. Most farmers and advisers in Devon now consider 60 units of nitrogen to be an economic maximum for spring barley; this figure should combine both residual and fertilizer nitrogen. In addition, 30–50 units of phosphate and 30–50 units of potash should be applied, depending on soil deficiencies and past cropping. Occasionally, much higher rates of nitrogen have been used, but rarely justified, unless a policy of continuous cereals is being followed.

N.A.A.S./N.I.A.B. Trials

For many years the N.A.A.S. in Devon, in collaboration with the National Institute of Agricultural Botany, has been undertaking trials on barley varieties. At one time these trials were divided into separate malting and feeding varieties. More recently the premium likely to be obtainable from a specialized malting variety did not compare favourably with the increased yield output from the newer varieties, which are generously treated with nitrogen, and no separation into malting and feeding categories therefore took place.

It may at first sight seem strange that the Devon N.A.A.S. should bother with such trials, when the N.I.A.B. has an outstation at Seale-Hayne Agricultural College. Yet when one considers that the county stretches for some ninety miles from north to south and almost as far from east to west, with a rainfall ranging between 30 and 60 inches, and with elevations ranging from 25 to 1,000 ft, the need for such investigations becomes apparent. Some new varieties which show promise when tried in the more northerly parts of the south-west region fail miserably when grown in Devon and Cornwall. An example of this is the variety Cambrinus which has proved to be very susceptible to leaf blotch.

One of the advantages of the N.A.A.S. undertaking such trials is that the advisory officer has a ready-made demonstration area. Over the years many of these trial sites have often been combined with farm walks, or with demonstrations which have always been well attended. One of the reasons for this interest is that farmers can see and judge for themselves, under local conditions, the behaviour of some of the promising new varieties they are likely to be offered by the trade in the next year or two. Advisers also value the comments on and criticisms of varieties, some of which may be growing for the first time on nearby farms.

The layout of these trials consists of randomized plots in blocks with two or more levels of nitrogen. The crop is given a basic fertilizer dressing in accordance with the usual farm practice, and extra nitrogen is applied to certain blocks; this additional nitrogen is applied either in the seedbed or as a top dressing. This procedure enables the standing ability of a variety under

Plots of different varieties of barley planted as part of the Devon trials in 1965

different levels of nitrogen to be determined. Severely laid crops are not favoured, and good straw is valued both for bedding and for feeding purposes. It is an interesting exercise to consider what information of value has been obtained from barley variety trials carried out in Devon since 1954.

Varieties

The highest yield per acre recorded in any trial was with the variety Carlsberg at 55¾ cwt per acre, which was closely followed by Proctor at 52¾ cwt per acre in 1956. It should be borne in mind that plot yields are often inflated as they do not take in headlands and are usually sited on the better farms. The variety Proctor has been constantly reliable over a period of ten years, but has on occasions been outyielded by Pallas, Maythorpe, Carlsberg, Herta, Rika and Vada.

Compared with other varieties, Proctor has the advantage of good ear retention in prolonged harvests. Newer varieties which have done well in N.A.A.S./N.I.A.B. trials in recent years and show promise are Impala, Maris Baldric and Zephyr.

A worthwhile response was rarely obtained from the late top dressing with nitrogen, and the response to additional seedbed nitrogen may often be very limited if the farmer's level of nitrogen is adequate.

Disease susceptibility

The disease which has been constantly recorded is mildew (Erysiphe graminis). It usually reaches a level of 5–12 per cent on most barley crops in Devon, and in one year's trial was recorded at a level of 25 per cent on the varieties Carlsberg and Domen. The varieties Union, Cambrinus and Maris Badger are normally resistant to mildew but in 1964 mildew was found even on these varieties. Mildew is usually favoured by rapid growth following late sowing and heavy nitrogen applications. Leaf blotch (Rhynchosporium secalis) has become of more importance to the barley grower in recent years. It appears to be favoured by early sowing.

Qualities which are of great importance to growers in this county and which influence the selection of varieties giving high and consistently reliable yields are:

- Straw stiffness and the ability of a variety to stand a spell of bad weather when almost ripe.
- Resistance to diseases, the most important being mildew and leaf blotch.
- Relatively early ripening, which usually means better conditions for harvesting.

Combine drilling

In addition to variety trials other investigations have been undertaken. One such investigation was started because for a number of years progressive farmers in the more fertile and conventionally arable parts of the county had questioned the value of combine drilling fertilizers for the barley crop. These doubts in particular were commonly expressed by farmers on the true redland soils. These queries led the Devon N.A.A.S. in 1962 to lay down a fully replicated trial. The object of the trial was to compare the effect of broadcasting and combine drilling three levels of complete fertilizer on yields of spring barley under conditions of high fertility. This trial was repeated over a period of three successive years with very different seasons.

The justification for undertaking this work was the considerable interest in using grain-only corn drills, together with bulk delivery and contract spreading of fertilizers, with the objectives of speeding up drilling operations and lowering costs. In addition, some farmers were doubting the need to replace high-cost combined fertilizer drills which had a relatively short life. The results of the trial followed a similar pattern each year, and confirmed the views held by a number of farmers that, under conditions of high fertility, no material advantage is gained by combine drilling. Similar results have been obtained on trials conducted by other investigators, but on less fertile soils the combine drill should not be dispensed with too lightly.

With ever-increasing costs, a partial failure of a crop cannot be tolerated, and maximum yields must be obtained. Farmers are constantly being offered new varieties with attractive claims as to their potential. The breeding and trials of these new varieties have often been carried out in another part of the country where growing conditions differ greatly from the south-west country. Unbiased local trials of such varieties are therefore valuable, and enable farmers to save themselves unnecessary expense or even crop failure.

The author of this article is **A. J. Brown, B.Sc.**, who is Deputy County Advisory Officer of the National Agricultural Advisory Service in Devon. Some of the material for the article has been provided by his colleagues in the N.A.A.S. county and regional staffs.

The Aims of PIDA's Accreditation Scheme

James White

THE principal purpose of the Pig Industry Development Authority's Accreditation Scheme is to spearhead genetic improvement in the industry. How will the Scheme work and how will the improvement be achieved? In the first place, the objective of the Scheme is to achieve all-round improvement in the performance of the national pig herd. Improvement can be brought about in two main ways: by increasing the concentration of desirable genes in the pig population, and by improving the environment under which the pigs are kept. Close observation will be kept on the latter point, but so far as Elite and Accredited herds are concerned, the Scheme will deal more with genetic improvement.

The primary objective, then, will be to increase the concentration of desirable genes in the whole pig population. There is no direct method of improving the mass of herds. Any attempt to bring about improvements in the national herd by the application of any breeding programme, however well conceived, would inevitably fail unless very strict control could be exercised over the entire industry. But control of this sort is neither practicable nor desirable.

The thinking behind PIDA's Scheme is that the best means of attaining overall improvement is first to apply a programme of improvement to a selected and limited section of the pig population and then to disseminate the improved stock throughout all of that population. In other words, PIDA will concentrate its efforts towards genetic improvement of Elite and Accredited herds and then, by all possible means, will encourage the general run of pig producers to use improved stock only.

Future pattern

At this stage one should perhaps outline what might be the pattern of pig production in the future. Many pig producers will agree that there is an urgent need to tidy up and streamline the different spheres of production so as to make the industry more efficient. In the past some producers have

tried to do too many things at once and have attempted to improve in too many directions at the same time. They have, not surprisingly, failed.

The classical breeding pyramid illustrates how the Accreditation Scheme should fit into the overall pattern of pig-breeding. At the peak of the pyramid will be the Elite herds. A particularly intensive programme of testing, selection and culling will be applied to these herds for future breeding. The programme will identify superior animals and maintain a high standard of quality. The main purpose of the Elite herds will be to provide high-quality boars for use in Accredited herds, which will come immediately below Elite herds in the pyramid. The Accredited herds will multiply the high-quality stock produced in the Elite herds. While they will be subjected to testing, it will be less intensive than that applied to Elite herds. Improved stock for use in specialist and commercial breeding herds will be bred by Accredited herds.

The next layer in the pyramid will be specialist breeding herds. Their main task will be to produce good female stock for use in commercial herds. The specialist breeders will get all their parent stock—male and female—from Elite and Accredited herds. Many will specialize in producing hybrid females.

The broad base of the pyramid will be the commercial breeders who are interested only in producing animals for one or other of the various sections of the pigmeat market. These breeders will probably use in their herds only females specially bred from proved parent stock bred by the specialist hybrid producer. Ideally, all boars used in commercial herds will be from Elite or Accredited herds.

Herds in groups

It is difficult to forecast precisely how many herds there will be in each group. However, the number of Elite and Accredited herds will be about 70 and 200 respectively. The sow and boars within these groups will total about 11,000 and 1,100 respectively, quite enough to dispel fears about inbreeding. While these figures have been calculated on the basis of an average of 40 sows in each herd (a figure arrived at from analysis of the herds which have already applied for Accreditation), there will be no limitation on the size of individual Elite or Accredited herds.

So far as breeders specializing in the production of females for commercial herds are concerned, there may be between 3,000 and 4,000 herds, with a total of about 75,000 sows. Finally, at the base of the pyramid, there may be about 50,000 commercial breeding herds with a total of 700,000 sows.

Specialization

The time may not be far distant when breeders will have to decide which aspect of production they want to follow. Certainly, the category which breeders choose will depend to a very large extent on individual circumstances. But, to be really efficient, it will be necessary to specialize in one aspect of production and do it really well.

There may well be slight overlapping of one category with another within a herd. But this should be avoided as far as possible. While improvement of the whole pig population is, of necessity, a long-term project, the rate of progress will depend on the degree and rate of improvement achieved in Elite and Accredited herds. Clear objectives must be set for breeders in

these categories to pursue. There must not be too many objectives or little progress will be made in any particular direction.

Because of this it is proposed, initially, to aim at two principal targets. One will be the improvement of feed utilization and the other will be the improvement of carcass quality mainly as expressed by the lean meat content of the carcass. Obviously the former is important, irrespective of the market aimed at. So far as the latter is concerned, PIDA believes that the concept of expressing carcass quality primarily as lean meat content of the carcass will concentrate attention on the basic need of the various markets.

Other aspects

There are, however, other aspects which must be kept in mind when considering a programme of testing intended to result in overall genetic improvement. One is that such a programme is valid only for those traits which are to a reasonable degree genetically determined. Also, the only factors worthy of an intensive and expensive testing programme are those justified on the grounds of economic importance. This is certainly true of food utilization and lean content.

In addition, the intensity of selection will determine the rate of improvement. It is essential, in other words, to test a very large number of boars in order to select only the very best for use in the Elite and Accredited herds.

Boar testing

PIDA is increasing its facilities in two ways to test a sufficiently large number of pigs. In the first place, testing stations will be modified to accommodate two pigs in a pen where only one was formerly kept. Tests have shown that this is quite practicable. New houses will also be built; these will accommodate up to 2,600 boars at a time or 6,500 individual boars over a year.

Traditional performance and progeny tests are being integrated under the new Scheme and PIDA is describing this system as 'combined testing'. The basic testing group will consist of two young boars, one castrate and one gilt. Six groups by the same sire will constitute a complete progeny test of that sire. The castrates and gilts will be slaughtered when their average live weight is 200 lb (exceptionally 260 lb), and will be assessed for carcass quality. The boars will be classified, on the basis of contemporary comparison, as suitable for use in Elite or Accredited herds, or for sale to other herds at the discretion of the breeder. Boars not falling into either of these categories will be slaughtered. In a nutshell, then, the complete test of the six litter groups will constitute a full progeny test of the sire. But, at the same time, 12 sons of that sire will be performance tested.

Ideally, Elite herds should test all the progeny of every stock boar, but on grounds of expense and practicability this is not feasible. PIDA considers it both reasonable and necessary, however, for Elite herds to test at least a sixth of the output of their boars. This will be done by testing six litter groups from every stock-getting boar every year it remains in the herds.

Accredited herds will normally be expected to submit annually one litter group for performance testing for every four sows in the herd. The main purpose of this is to maintain a check on the quality of the stock being produced.

Litter recording scheme

To ensure that prolificacy and mothering ability are not allowed to deteriorate in Elite and Accredited herds, minimum standards of litter production will be applied. All herds will have to record under Part I of PIDA's litter recording scheme. The factors recorded, e.g., numbers born and reared, litter weights at three weeks, farrowing interval, are very weakly inherited and selection for them may be rather unrewarding. But breeders must remain conscious of the importance of these factors.

Another important aspect of Accreditation is the health status of herds. A close check must be kept on the health of Elite and Accredited herds so that commercial breeders may purchase stock from them with confidence. It is hoped that a pig health scheme will be introduced and that membership will be obligatory for Elite and Accredited herds.

Generally, Accreditation will be one of the most important and far-reaching projects yet tackled by the pig industry. It will not be easy for the participants but, with the co-operation of pedigree breeders, it can work. Indeed it must work, for it may be the most important weapon in our pig industry's battle against overseas producers who wish to capture the British market for pigmeat.

The author of this article, **Mr. James White,** has been Chief Livestock Officer of the Pig Industry Development Authority since its inception. He has had wide experience of managing large estates, and has also been employed by the Ministry.

Aldrin and Dieldrin Cereal Seed Dressings

To avoid harm to wild life, farmers and agricultural workers are reminded that cereal seed dressings containing aldrin and dieldrin should only be used on seed for autumn sowing and then only where there is a serious risk of damage by wheat bulb fly. Seed treated with such dressings may not be sown after 31st December.

There are no restrictions on the use of dressings containing gamma-BHC which may be even more effective for mid-December and later sowings.

Waste wet ground planted with poplars

Trees on the Farm

Ian Moore

MOST of us farming today have inherited from our predecessors a rich variety of trees which not only beautify our own farms but also add wealth to the English landscape. Many of us have had occasion in recent years to fell or uproot trees when making small fields into more workable sizes, thereby reducing the labour involved in hedge maintenance or easing the way for a greater intensification of mechanization. Have these victims of modernization been replaced? Have we made our contribution to posterity as did our fathers and grandfathers before us? These are questions which every farmer, large or small, rich or poor, should ask himself. This, I believe, is a duty we owe to our successors.

Seventeen years ago I became responsible for a 400-acre estate, richly treed and beautiful, but sadly in need of adjustment to meet the needs of modern farming. With very modest means at my disposal, comparable to those of most farmers even though the estate belongs to the Seale-Hayne Agricultural College, I have endeavoured to modernize the estate and yet at the same time retain its English character and beauty for the benefit of those who follow me. In this article I have set out my experiences in the hope that they will be of help to others.

Heritage for the future. Standard hardwoods planted in a hawthorn hedge

Selecting the species

It is well to bear in mind that once a tree is planted it is not likely to be changed for fifty to a hundred years or longer. Care is necessary, therefore, in selecting the species to plant and the pattern of planting to adopt. To succeed, trees must be in tune with their environment. So far as species are concerned, a very good guide is to observe the trees which have grown to perfection on the farm or in the near vicinity. Coniferous trees and the softwoods generally give quick growth but on some sites the hardwoods, though slower in growth, do much better. As with crops, on good, fertile, well-sheltered ground the choice is wide, whilst the more removed from ideal conditions one goes the more restricted the choice. On thin, chalk soils, for instance, beech should be planted with conifers as a nurse crop (which can be grown to pole size) if a largish area is to be planted. On heather only pines succeed, whilst Japanese larch should be selected for bracken-clad slopes and the spruces chosen for wettish grassland.

Ash is common on most lime-rich soils and, given fertile conditions and adequate moisture, grows fast, whilst sycamore grows under comparable conditions. My own favourite on average land is the crimson horse-chestnut—a glorious tree when in full flower, and a joy in the early autumn with its richly-coloured leaves. I must admit also having a weakness for the weeping silver birch; once established, this tree provides a ready supply of seedlings each year from wind-blown seeds.

Most farms, alas, have their unproductive patches of land. By reason of our contours we are uncommonly well blessed in this way! We have rough areas which are unploughable because of their steepness, small valleys and marshy areas. These eyesores and vermin havens can be speedily and quite cheaply converted into productive units, and at the same time can provide pleasing adjuncts to the countryside. On some of our wettish patches, where poaching by the grazing animal was a constant menace, 6-foot poplar sets spaced about 20 feet apart have been planted. These should mature in about 30 years, when the logs are readily saleable to match manufacturers or those making chip baskets. The cricket bat willow (*Salix alba var. coerulea*) needs comparable conditions but matures even quicker, say in 12–15 years, when it is in good demand from bat-makers. In both cases it is important to choose the right strain and prune away the lower branches.

Hedges

The advent of the mechanical hedge trimmer has sounded the death knell of much valuable timber for future generations. In days gone by, when hedge trimming was a skilled man's job, oak saplings and elm suckers were always left. These have formed a major source of good-quality timber over the years on many farms. To leave these potential trees, however, when a mechanical hedger is used, is a nuisance as it slows down the work and often needs someone to return with a hedge slasher to trim around the young tree which has been left. So, in most cases, the future is sacrificed on the altar of speed and convenience.

In our hedges we have planted hawthorn with oak, elm, beam, sycamore, and Norway maple as standards at 30-feet intervals, and this arrangement makes a fine hedge. It means more trouble when the mechanical hedger is used but we think the additional labour is worth while and that such hedges are a real asset to the farm.

Advantages in tree-planting

Perhaps I have dwelt too long on my concern for the beauty of our landscape and my belief that we have a duty and responsibility to future generations. Let us see, therefore, if there are concrete advantages in tree-planting. In my view there are some very important ones. The danger of erosion developing on a large scale in many parts of this country as a direct result of felling and the removal of hedges has recently become very real. We have evidence of this trend on our own farm. Further evidence comes from the eastern counties which have a climate completely contrasting with that of the south-west.

One cannot be at all grass-minded without appreciating the great benefits of shade and shelter, and the levelling-out of extremes of heat and cold which well-sited shelter-belts provide. It is not for a mere amateur to give advice on this all-important problem; the Forestry Commission staff are always most helpful, and indeed anxious to co-operate with the farmer, as we have found from our own experience. Financial help is also available to those planting on a considerable scale. Then, too, a good case for shelter for crops can also be made. Our earliest bite fields are well hedged round and these fields also

Waste patch planted with Christmas trees

supply the latest grazing in autumn. Fields safest for early drilling in the spring are equipped in this way. But wind and shelter-belts must be designed to suit the farming pattern as well as topography and wind direction, and here professional advice should be sought. The Agricultural Land Service can give help in such cases.

Norway spruces are easy to grow and within five years the thinnings find a ready sale as Christmas trees. If allowed to grow on, the timber has many uses on the farm. Japanese larch (*Larix leptolepis*) are also useful for farm timber and the trees have the most striking colouring in spring and autumn. Usually shelter-belts consist of hardwoods and softwoods, selected according to soil, position and the landscape. A good combination is beech and sycamore for the outside rows with conifers to give depth, and with occasional plants of Norway maple and the wild cherry dotted about for their pleasing effect.

When purchasing the plants, a reputable forest nursery will give helpful advice. I favour 2 + 1 transplants of the hardwoods, i.e., transplants that have been two years in the nursery bed and one year transplanted. Any farmer who envisages planting-up a fair area would be well advised to create his own nursery. One-year seedlings, which are cheap to purchase, can be left in the nursery bed until well grown and can then be transplanted to the final site when weather, soil and labour conditions on the farm are favourable. Moreover, by this plan one always has replacements available for any failures. The ideal time for planting is late October to early April, when the trees are dormant. Various planting methods and tools are available but the ordinary spade meets most needs. Standard trees should be well-staked at the time of planting, and staking should be maintained until the tree is sufficiently well-established to grow on unsupported.

Once the habit of tree-planting is acquired it grows. There are many occasions and ceremonies in home life which justify the planting of a tree. This simple act of faith has a profound influence on children and provides them with a new and lasting interest and a stake in the countryside. Village schools, and town schools, can be encouraged in this habit when they see a near-by example on a neighbour's farm. Nor must the trees one has inherited be neglected. Pruning and cutting out dead branches and diseased limbs costs little, for it can be done when labour demands are slack, and helps to provide that smiling face of a well-kept farm. The essence of good husbandry is accepted by every conscientious farmer, namely, to leave the land in better heart when he retires than when he took over. It should be equally accepted as his duty to leave his farm as well-enriched with trees as when he took it over.

H. Ian Moore, C.B.E., M.Sc., Ph.D., N.D.A., Dip. Agric.(Cantab.), is Principal of Seale-Hayne Agricultural College, Newton Abbot, Devon.

34. West Northamptonshire

J. E. Tristram

THE Daventry and Brixworth district, which extends northwards from Northampton to Leicestershire and westwards to Warwickshire, comprises 95,000 acres and abounds with features of historical, geographical and agricultural interest. Within its boundaries lie Naseby, where the decisive battle of the Civil War was fought (Broadmoor, Prince Rupert's, Cromwell and other farm names are reminiscent of those troubled times); Daventry, famed for its Stone Age camp remains and high-powered wireless transmitter—the mast at nearby Dodford is the tallest in Europe; Ashby St. Ledgers, where the Gunpowder Plot was hatched in the gatehouse; and Brixworth, with its still unspoilt seventh century church. The ancestors of the first and second Presidents of the United States lived in the district—George Washington's at Little Brington and those of John Adams at Flore.

The rivers Avon and Nene rise in Naseby. Cold Ashby's Honey Hill (about 700 ft) is the highest point for 100 miles eastwards to the North Sea. The A.5 London—Holyhead road (Watling Street), and the M.1 and M.45 motorways intersect the district. The canal at Whilton rises 63 ft in three-quarters of a mile through seven locks—known to narrow boatmen as Whilton Stairs. This constitutes the steepest lift on midland waterways.

The geology is mixed and few parishes or individual farms, except those to the west where lias and heavy boulder clays predominate, are composed of one soil type. The remainder consist of mixtures of clays, loams and Northampton sand with pockets of gravels, estuarine sand and limestone. These geological changes do not coincide with the undulating topography and give rise to a truly mixed soil type. Dr. Smee, of London University, has located over thirty geologically different soils in Hazelbeech parish. The majority of farms and individual fields comprise two or more soils of markedly different texture which creates problems with rotations and cultivations. Despite these variations the soils are mostly highly productive and, under reasonable management, can give crop yields well in excess of the national averages. The 800 holdings vary in size from less than 50 to over 2,000 acres, with the majority falling in the 150–300-acre range.

There has been a spectacular change in farming patterns during the past two decades. Systems of 'dog and stick' farming were traditional, many farms having little, if any, arable. Although less renowned than the adjacent Welland valley pastures, much of the permanent grassland is, or was, first quality feeding land. Some of this is still farmed under the traditional system.

Store cattle are purchased from west country markets, from Ireland via Banbury and other local auction marts, or through dealers, in the spring and sold fat off grass in the summer. These are followed by a second and often a third run of stores, purchased during the summer and finished ready for sale in the late summer and autumn. On some feeding farms sheep are grazed together with cattle. On other farms cattle are grazed separately through the summer and store lambs are bought in during the autumn to clean up the pastures and to finish after the cattle. The better feeding pastures are unstocked in winter. The grazier's skill in adjusting the stocking rate in anticipation of the growth of grass and his skill in knowing the type and condition of store animal that will thrive and give the best rate of gain on his pastures has to be witnessed to be fully appreciated. It can only be described as an inborn instinctive art: 'If they're bought right, they're sold right'.

The number of dairy herds has declined in recent years, but those remaining have increased in size. Herds of 60–100 cows are now common, and the system of management is almost entirely yard-and-parlour. The Friesian is the predominant breed for milk and now vies with the Hereford and other beef breeds in popularity with the grazier as a quick-maturing animal giving good weight for age. All breeds of cattle, from the indigenous and locally-bred British White to the recently-introduced Charolais are to be found, but total cattle numbers continue to decline.

The large sheep population is kept mainly for producing fat lambs from grass. A few flocks of pure-bred Wiltshire Horn (Northampton is the centre of this Breed Society's annual show and sale), pure-bred Suffolk and Clun Forest are kept, but flocks generally consist of Hill and Down crosses. Large numbers of ewe lambs and theaves are bought in each autumn from north- and west-country sheep sales.

Pig production comes mainly from small units on the general farm which produce weaners for sale. Finishing for pork or bacon is carried out on a small number of specialist farms which have suitable buildings and equipment. Poultry keeping is mostly confined to a few specialists with large units in batteries or deep litter.

Recent economic changes have resulted in a change-over to systems of arable farming; the district is now about 50 per cent arable (100 per cent on a few farms) with approximately 30 per cent of the total area growing wheat or barley. Rotations which include break crops of roots, pulses, herbage seeds or temporary ley are the general rule. But despite the hazards of take-all, eyespot and other cereal root diseases, to which the area appears particularly prone (one wonders if this accounts in part for the tradition of permanent pasture), an increasing number of farmers are now growing a close succession of cereals.

The striking change in farming systems has resulted in an equally striking change in equipment and buildings. As recently as 1957 most holdings had few buildings—a brick, stone or mud-walled barn and open cattleyard with poor access. Farms of any size are now equipped with grain drying and storage facilities, covered yards and reasonable access roads.

The now popular system of floor drying of corn was evolved and developed here, and the first complete environment-controlled farm potato store in the country operates in this district. Yet another first in the field was the erection five years ago of the first haylage tower in the midland and eastern counties.

Agriculture's Role

in the

National Economic Development Plan

THE Government's National Economic Development Plan (Cmnd. 2764), published recently, shows that agriculture is one of the industries with a key role in the plan for faster economic growth. Agriculture's main contribution to the Plan will be of two kinds. First, it will help through increased production to meet the growth in demand. This will ease the pressure on our bill for imports of temperate agricultural produce. Secondly, by improving its labour productivity more rapidly than the increase in production, agriculture will continue to release substantial manpower resources and so help in closing the manpower gap expected during the Plan period.

The views of the agricultural industry on what was technically possible were sought as part of the inquiry addressed to all branches of industry. The Government considered these production possibilities against the background of the industry's past performance and in the wider context of the economy as a whole, including the international commercial relations of the United Kingdom, and the physical and financial resources which might be required for such an expansion. In the light of these factors, the Government has come to the conclusion that home agriculture can make its best contribution to national economic growth through a selective expansion programme based upon the maintenance of the rate of increase in the industry's productivity. No definite production targets are set because the rate of expansion of different products will depend on technical possibilities, on the development of international commercial relations, on the use of resources and on the progress made in increasing productivity.

The Government expects home agriculture to be able to meet a major part of the increased demand for the kinds of food that can be grown in this country. This increase in demand for human food is expected to total some £200 million by 1970. The industry would also supply much of the cereals required for the increase in livestock production. In those commodities such as eggs, poultry and maincrop potatoes, where the United Kingdom is already virtually self-sufficient, the need will be to meet increasing demand during the Plan period. In the case of sugar, home production can meet a part of increasing demand without raising international problems or the need to increase factory capacity.

Meat will have one of the most important parts to play in the programme. Mutton and lamb and pigmeat can make a substantial contribution to our increasing requirements, consistently with our commitments to our overseas

suppliers. But the main emphasis will be on the expansion of beef and veal production, which will have to be increased to the full extent of the technical possibilities. Since the largest part of the United Kingdom's beef production comes from the dairy herd, this inevitably means an expansion of milk production, which will be needed to meet the rising demand for liquid milk and fresh cream, and will also satisfy a large part of the extra demand for milk products. Expanded livestock production will considerably increase the demand for cereal feed, and consistently with our international commitments a substantial part of this additional requirement will need to be grown at home. Finally, horticulture can contribute by meeting a substantial part of our increased demand for horticultural produce which can be grown in this country.

The industry has achieved an annual growth in labour productivity of about 4 per cent in 1954–60 and about 6 per cent in 1960–64. Rather more than half of this is due to rising output and the remainder to the release of manpower. During the last decade the number of agricultural workers has fallen by 25 per cent, at a rate of 20,000 workers a year. The Government's view is that it is of great importance that agriculture should maintain, and if possible increase, its contribution to the labour supply of other sectors through a continual release of men from the industry.

The Government recognizes that the industry will need to have the physical and financial resources for this programme. Like other parts of the Plan, the programme will have to be kept under constant review to assess the resources required and to measure the progress being achieved. The machinery of the Annual Review under the Agriculture Acts of 1947 and 1957 will be used for this purpose. In making its determinations on guaranteed prices and relevant production grants at future Reviews the Government will therefore take account of the expansion programme which it wishes the industry to undertake, as well as all other relevant factors.

Although the determination of the guarantee arrangements must be left to the Annual Review machinery, the Government has already made a number of statements, in the context of the National Economic Development Plan, relating to particular commodities:

(*a*) with regard to *beef*, in the absence of any significant change in circumstances the guaranteed price will at least be maintained at its existing level for the next three years;

(*b*) in fixing the standard quantity for *milk* at the next Annual Review, the Government will take account of the talks with the industry on the appropriate level of the national gallonage of milk and of the role of an expanded national dairy herd in providing for extra beef production;

(*c*) the standard quantities for *wheat and barley* will not be reduced below existing levels over the next three years, but will be related to the expected growth in the market.

IN BRIEF

Changes in Bull Licensing

After the 31st December, 1965, general class licences will cease to be available to bulls of the Ayrshire, British Friesian, British-Canadian Holstein-Friesian, Red and White Friesian, Guernsey and Jersey breeds. Bulls of these breeds will thus be refused any licence unless they reach the standards prescribed for a dairy bull licence; details of these minimum standards of milk yield and butterfat content of ancestors of the bull may be obtained from any livestock husbandry advisory officer or divisional office of the Ministry. The new arrangements apply to both pedigree and non-pedigree bulls, and mean that no bulls of these breeds will secure a licence on visual inspection alone.

Animal Disease Surveys Report No. 2, Part II: Fluorosis in Cattle

The first part of the second report in the series of animal disease surveys carried out by Animal Health Division of the Ministry of Agriculture, Fisheries and Food was published in November, 1964. This gave the results of a survey carried out in various industrial areas of the country to assess the extent of the fluorosis problem. It was shown that most of the farms with severe fluorosis were within 2 miles of a probable source of fluorine emission, but that farms with moderate or mild fluorosis extended over a much greater area, frequently 3–4 and sometimes 6–8 miles distant from the sources.

Part II of the second report has now been published and deals with experimental studies made over a period of eight years. These studies were concerned with the development and the possibility of alleviating the disease in a self-contained dairy herd on a seventy-acre farm in an industrial area in Staffordshire. It was known that the herbage on this farm was contaminated by fluorine compounds emitted into the atmosphere from various industries. For the first 5½ years the alleviating effect of dietary supplements of aluminium sulphate, with and without additional calcium and phosphorous compounds, was studied; for the remaining 2½ years no mineral supplements were fed and an assessment was made of the value of good farming practices on the level of production in a herd affected with fluorosis.

The studies showed that the mineral supplements merely delayed but did not prevent accumulation of excessive levels of fluorine in the skeleton, and were of no practical value in the control or alleviation of the disease. But the results did show that good farming practices, in particular good pasture management, provided the best method of alleviation. These results indicate that the measures now being employed by farmers to stimulate the growth of grass by the application of fertilizers as a means of increasing stocking and thereby production, together with the careful management of the pastures and control of intercurrent disease in stock, can play an important part in alleviating the effects of fluorine contamination, thus enabling dairy farming to be carried out profitably in industrial areas where herbage has a moderate degree of fluorine contamination.

Electricity in the farm dairy

The Electrical Development Association has recently published a 100-page booklet *Electricity in the Farm Dairy* which contains advice to the farmer on the choice of equipment and on its installation, operation and maintenance. The booklet, which is number 8 in the Association's series of Farm Electrification Handbooks, includes a chapter on the cleaning and disinfection of milking equipment. The various types of water heater are considered and information is given on their installation requirements and maintenance. There are also chapters dealing with electric steam raisers, milk cooling and the choice and installation of refrigerated milk-cooling equipment.

Electricity in the Farm Dairy is available on request from Electricity Boards and direct from the Electrical Development Association, Trafalgar Buildings, 1 Charing Cross, London S.W.1.

Young ideas wanted

Young people with ideas on how to run a modern farm will have the chance to put across their ideas—and at the same time win a prize—in a competition to be run in conjunction with the National Power Farming Conference at Brighton in February, 1966. The competition is open to anyone in the British Isles aged thirty-one and under and currently employed in the agricultural industry or studying at a farm institute or college. A cheque for £50 and a cup will go to the winner. There will also be a special silver cup for the best entry submitted by a team from a farm institute, agricultural college or young farmers' club.

Competitors will be given full details of an imaginary farm—rainfall, soil type, existing services, etc., and will be asked to choose suitable buildings and machinery, and to suggest a cropping programme for the efficient and economic running of the holding. The competition will be judged by a panel of agricultural experts. Closing date is 31st December, 1965. Entry forms and copies of the rules may be obtained from the Administrator, National Power Farming Conference, Dorset House, Stamford Street, London S.E.1.

Producing milk for profit

An interesting and well-illustrated booklet entitled *Producing Milk for Profit* has recently been issued by I.C.I.'s Agricultural Division. The booklet is a case study of milk production on the 125-acre farm of Mr. E. Bushby of Watson Hill Farm, Egremont, Cumberland, and it was produced in connection with a demonstration held at the farm in September, 1965. Faced with the dilemma of rising costs. Mr. Bushby set about lowering production costs by making full use of his land, labour and capital; the booklet describes how he succeeded in doing this. It is perhaps significant that the demonstration, at which Professor W. Holmes of Wye College spoke, was attended by 500 farmers.

Books

Chemistry of the Soil (2nd Edition). AMERICAN CHEMICAL SOCIETY MONOGRAPH NO. 160. Edited by FIRMIN E. BEAR. Published in England by Chapman and Hall, 1964. 160*s*.

This is an enlarged and rearranged version of the A.C.S. monograph first published in 1955. The original material has been revised extensively to include reference to research results obtained during the past decade. Six of the fourteen authors, who review aspects of soil chemistry, are new contributors. Two new chapters are included—on soil biochemistry and radioisotopes.

The book is intended primarily for research workers concerned with the nature of soil as such or with soil in relation to plant nutrition. Written from the chemist's viewpoint, the approach is generally analytical. The first half of the book traces the changes that have occurred and are still occurring in the rocks and the soils derived from them as the result of meteorological, geological and biological agencies. These comprehensive reviews of soil development and composition are followed by chapters more likely to interest the agriculturist: on soil properties, the nature and possible origins of soil organic matter, trace elements, and the fixation of plant nutrients by soils. A 50-page review of soil chemistry and plant nutrition includes an interesting but brief historical introduction.

The last chapter on soil analysis is disappointingly parochial, for it is limited to descriptions of techniques used in the New Jersey Agricultural Experiment Station's soils laboratories. Two other important subjects receive little attention: there is only one paragraph on pesticide transformations in soils, and soil/water relationships are discussed only with reference to salinity and the quality of irrigation water. Nevertheless the book will be valuable to soil scientists, students and advisers as a reference source. But may I enter a plea for an author index to the enormous field of literature references cited?

S.L.

Sheep Production and Grazing Management. C. R. W. SPEDDING. Baillière, Tindall and Cassell, 1965. 63*s*.

This is a stimulating and timely book, for it appears when farmers and those associated with them are concerned with the existing level of profitability of the sheep industry. Perhaps wisely, Dr. Spedding, of the Grassland Research Institute, Hurley, has not ventured into the economic field, but there is no doubt about his awareness of its importance. This is refreshing and realistic.

The book cannot be fully appreciated unless current financial trends are understood. Basic costs such as rent, labour, machinery and sundry items have all moved in one direction—upwards. In ten years, they've risen by 40–50 per cent, but incomes per lb of lamb and wool have changed but little.

Fortunately, improvements in the biological processes of sheep production, which forms the core of Dr. Spedding's book, go a long way to increase output per ewe, per acre and per £1 invested. Biological and economic efficiencies are therefore genial companions.

The scope for future potential lies in the further exploitation of three factors (a) the pasture yield, (b) animal health, and (c) the reproductive rate of the sheep.

In the U.K., the average annual yield of a well-managed grass clover sward, untreated with nitrogen, is some 5–6,000 lb D.M. per acre. But the combined use of nitrogen with irrigation (where needed) might well double the D.M. yield.

Just what is the economic ceiling of nitrogen usage and its pattern of application must await further research, but there is no evidence to suggest that heavy dressings are injurious to animal health.

In terms of management, the various infectious diseases are likely to be more troublesome with large populations of young susceptible animals. The ecology of the various parasitic worms is discussed in detail, but symptoms and treatment of infected animals are not a part of this book. Importance is, therefore, attached to good management by the farmer. The fashionable research on sheep psychology and animal behaviour is discussed in relation to intensive methods, such as set and rotational stocking, and forward creep grazing.

Discussing production, the author refers to the various breeds, the significance of litters of lambs, use of X-rays for pregnancy diagnosis, early weaning and artificial rearing of lambs. Employing all these modern resources, it has been shown,

experimentally, that liveweight gains of over 1,600 lb per acre in a 9-months grazing season can be obtained. This is at least four times greater than current commercial production.

The book is well produced, and contains a comprehensive list of references at the end of each chapter.

H.E.

Wings of Light. Compiled by GARTH CHRISTIAN. George Newnes, 1965. 35*s*.

Never have so many people from all walks of life found so much pleasure in the sight and sound and habits of wild birds.

This is undoubtedly true. One of the signs of expanding interest in any particular field is the appearance of anthologies—extracts usually reflecting fairly closely the sympathies of the compilers. There have been several such recently, but Garth Christian's anthology for bird-lovers differs, and excels, in three respects at least: in the breadth both of his outlook and of his search for treasure to expound it, and his personal commentary by which he strings his selected pieces together.

Thus this anthology, instead of relying upon an incidental collection of snippets, gains by becoming a symposium, with chapters on song, nests, migration, bird-watchers and so on. Some 170 authors are quoted and they range from poets and philosophers to famous naturalists and scientists, from sages to schoolboys, from household names to unknown rhymesters and reporters; and their extracts from fact to fancy, ancient to modern, light to serious. The search has been wide but the result apposite.

Whatever their particular attitude to birds, few who begin idly to turn a page or two will put this book down until at least a chapter has been read. It is all so well worth while. You will come across some passage you have known since childhood, another which you may have read recently and mentally underlined, and yet another you can't think how you've missed.

Eric Hosking contributes thirty magnificent photographs and the two end papers. His hesitant Collared Dove; his Blackcap and Heron with their respective nestfuls; and the Nightjar caught in the luxury of a gigantic yawn, couldn't be bettered. The text is clear and the whole book a delight to handle and own.

E.A.R.E.

Agricultural Policy in Britain. E. F. NASH. (Selected Papers edited by Gavin McCrone and E. A. Attwood). University of Wales Press, 1965. 21*s*.

This volume consists of a collection of nine papers and articles contributed to various journals from 1948 to 1962 by Eric F. Nash, late Professor of Agricultural Economics at the University College of Wales, Aberystwyth, whose untimely death in 1962 represented such a severe loss to his particular field of study. To his colleagues in that field many, if not all, of these articles will already be familiar. For them, perhaps, the book will afford a convenient and welcome opportunity to renew an earlier acquaintance with Professor Nash's writings. For those coming to his work for the first time, the book will serve as a stimulating introduction to the views and arguments of one who made the study of post-war British agricultural policy his special concern and who came to be regarded as its most consistent and most outspoken critic.

Eric Nash remained firmly convinced until his death that 'the general adoption of policies which, whatever their intention, have the effect of shielding agriculture from the influences tending to favour its relative contraction must collectively aggravate the economic difficulties in which the industry finds itself'. This conviction is perhaps most forcefully and persuasively argued in the essay which is given pride of place in this collection, *A Policy for Agriculture*, which was written in 1961.

All the articles, however, are worthy of their inclusion in this book—despite some inevitable retracing of ground—and are notable for their scholarly quality. In addition, several of them reveal Professor Nash to have possessed a rare ability to translate text-book economics into terms capable of being fully understood by laymen. If anyone should question the feasibility of this, they are advised to read here his address to the Farmers' Club in 1958 which might well stand as a model of its kind.

In their introduction to the book the editors, who are to be complimented on their selection, state that Professor Nash's contribution was that he put Britain's post-war agricultural policy under scrutiny at a time when few others seemed inclined to do so. Readers of the essays which follow this introduction will be left in no doubt as to the competent way in which he approached this task and why so many of his arguments have, in any fundamental sense, remained virtually unchallenged.

S.T.M.

Farm Machinery. A. G. HARRIS, T. B. MUCKLE and J. A. SHAW. Oxford University Press, 1965. 25*s*.

With the continued expansion of part-time agricultural education, the demand for suitable text-books is acute. The teaching of farm machinery, in particular, has increased rapidly and this book has been produced to help satisfy the need in this sphere.

To appraise the value of such a book, one must be guided by the aims of the authors. The preface, and the summary on the back cover, indicate it as being specially suited to those students studying for the City and Guilds examinations in farm machinery (No. 267 *Introductory* and No. 270 *Operation and Care*), also those for the National Certificate in Agriculture. The chapter layout does in fact follow very closely the layout of the 270 syllabus—which makes it all the more difficult to understand why farmyard manure-handling equipment is not even mentioned!

All teachers are faced with the problem of striking a balance between topics. In general, the authors have been more successful than many others but with some notable exceptions. Why, for example, is the tractor transmission so poorly served? The dual clutch is not discussed, the gearbox is dismissed in twelve lines, and brakes deserve rather better treatment than they have received. I was sorry to see, too, that the subject of care and maintenance is dealt with only sketchily.

There are also some surprising inaccuracies, misleading phrases and omissions. The description given of the action of a threshing drum and concave is not now held to be true; nor is the major cleaning factor in an oil bath type air cleaner that of centrifugal force; and the diagram of a sprayer makes no reference to a control valve.

The text is simple, clear and easy to read, and for this it is to be welcomed. The book is well illustrated with both diagrams and photographs, though some of the line drawings, to my mind, add nothing to the text. Most of the photographs could be omitted without detriment—especially those which are taken from 3 ft 6 in. × 2 ft 6 in. wall charts.

This book will doubtless be used by many students, despite its cost, but it suffers in being too much 'dual-purpose'—it is rather too specific for 267 needs, whilst insufficient in depth and detail for those of 270.

M.T.H.

Crop Husbandry. H. C. MASON. English Universities Press, 1965. 12*s*. 6*d*.

This is an elementary text-book intended primarily for young people studying for City and Guilds and similar examinations. In 170 pages and 27 chapters, Mr. Mason discusses a large number of topics, ranging over soils and their properties, fertilizers, cultivations, arable crops, pests and diseases, and grassland management and conservation. This extensive coverage has inevitably resulted in some imbalance and a number of omissions that detract from a useful and well-produced book. Three-and-a-half pages are woefully insufficient to do justice to a topic as important and many-sided as grassland management, and it is impossible to deal adequately with the cultivation, pests and diseases of the sugar beet crop in four-and-a-half pages, even at a fairly elementary level. Fertilizer requirements are described mainly in terms of sulphate of ammonia, superphosphate and muriate of potash; the unit system (1 unit = 1% of 1 cwt) is not mentioned, but it is surely the simplest way in which to express fertilizer requirements, and is being increasingly used nowadays.

The author does, however, discuss all the important farm crops grown in Great Britain, and also briefly describes the commoner farm implements and machines. The majority of the 71 text figures are good, particularly those of machinery, but a few are rather poor. A glossary, defining 108 technical and scientific terms, is another useful feature.

In spite of the above criticism, this book should prove useful both to the students at whom it is aimed, and to the layman with a casual interest in farming and the countryside. It is easy to read, well printed, and is certainly reasonably priced.

J.L.H.

Portrait of the Isle of Wight. LAWRENCE WILSON. Robert Hale, 1965. 21*s*.

Like the others in the well-known 'Portrait' series, this book is not a comprehensive history or guide; it is an attempt to give an impression of a region by someone who knows and loves it well. Mr. Wilson, whose acquaintance with the Island began with happy holidays in childhood, starts by casting an appreciative eye over its scenery in the first chapter entitled 'The Round Trip'. Appreciative, but not uncritical: for

example, he is forthright in condemning throughout the Victorian rash of villa-building, while of Quarr Abbey he says that it looks 'as though it made marshmallows, not monks'.

He then gives an urbane outline of the Island's history, dwelling on the human-interest stories of its diverse 'characters'. The rise of Sophie Dawes, the smuggler's daughter who conspired to murder her lover, one of the last of the French Royal house of Bourbon, is epigrammatically described as 'from Brandy to Bourbon' in an interesting if admittedly digressive chapter. The author also recounts several amusing anecdotes about such famous 'Islanders' as Tennyson and Queen Victoria.

Like nearly every other place on the southern seaboard, the Island was at one time rife with smugglers, and Mr. Wilson devotes a complete chapter to smuggler's tales and wrecks. The wrecks provide the more honourable stories of valiant rescues by lifeboats like the *Worcester Cadet*.

The book ends with a consideration of some of the present problems of the Isle of Wight. These mainly concern the increase in the tourist trade and the corresponding development of the Island. However, the author is confident that the vigilance of such bodies as the National Trust and the National Parks Commission will preserve its predominantly rural character and charm. Let us hope that he is right.

D.E.P.

Proteins: Their Chemistry and Politics. AARON M. ALTSCHUL. Chapman and Hall, 1965. 50*s*.

It is common knowledge that the provision of protein is a major nutritional problem in the world. Yet many do not know the extent of the problem, or how it can be assessed, or the steps that can be, and are being, taken towards its solution. Some may even be none too clear as to what precisely 'protein' is. For such as these, this book may have been especially written, but even those with professional knowledge and interests will find much that is stimulating, and students of nutrition should find the book most valuable.

Professor Altschul is well qualified for his task. A leading protein chemist and an international authority on plant proteins, he leads the work of the Seed Protein Pioneering Research Laboratory of the U.S.D.A. in New Orleans, but is much concerned with the application of laboratory findings to the business of feeding people. With reference to the last part of his sub-title, he asks the rhetorical question: 'Who can conceive of political stability in the face of hunger?'.

The book is arranged in four sections: the first two set the stage for the major part, by introducing proteins and describing them in terms of their constituent amino acids, their structure, shape and size, their synthesis and degradation. There follows a section on the role of proteins in the diet, with a historical account of the development of ideas concerning protein requirements, a discussion of the nutritive value of proteins, and of the effect of heat on food proteins: potentially preventable heat damage is responsible for the loss of the equivalent of 'millions of tons' of protein-rich foods.

The largest section deals with problems of protein supply, with estimates of the deficit in protein, particularly animal protein, and with attempts to make this good. There are twenty descriptions of oriental soybean products, and many more examples of traditional uses of other legumes in different parts of the world. Vegetable protein concentrates are discussed with special reference to soybeans, cotton-seed and peanuts, and in the final chapter more sophisticated approaches are briefly mentioned in the context of changing dietary habits.

The book is very readable, and has a comprehensive index; each chapter concludes with a selected bibliography. The author, in his own words, does not pretend to offer simple answers to a complex problem, but 'to present the fundamentals . . .'. In this he has succeeded well.

J.P.G.

Agriculture (Target for Careers). R. ADCOCK. Robert Hale, 1965. 9*s*. 6*d*.

Books on agriculture as a career seem to take a standard pattern. There are sections on farming today and its importance in our national economy; on the history of British agriculture with particular reference to the great improvers (whose names should be known in every household in the land if one judges by the frequency of their repetition); and on preparation, training, and jobs.

Mr. Adcock starts by outlining the changes in our farming through the years and centuries, and then puts the reader in the picture about agriculture today. He

presents a brief survey of crops, livestock and machinery, shows how they are all used in a farming system, and finally ties this to the annual calendar with a monthly summary of the main activities. This complete survey occupies half of the book.

The work is intended for careers teachers, parents and children who aim to make a career in agriculture but, like several others of this type, its appeal will be stronger for the more academically-minded young people. Although the language makes rather slow going at times, the approach is sincere and realistic; keen and single-minded people will find it worth the effort.

The second half of the book contains the real message, and ranges quite successfully over the prospects for anyone making a career in agriculture. It is clearly stated that to become a farmer is not open to everyone and that it needs plenty of money—the phrase 'large capital resources' is used.

Other careers are outlined, professional and technical, and there is a useful chapter on prospects for girls in rural employment. It is surprising, however, that comparatively little is said about work and career opportunities for the skilled farm worker. For all the thousands of people going into practical farm work and training each year, this is by far the most important goal.

Education and training are dealt with soundly—starting with school, the farm, part-time classes and prospects. There are lists of training and research establishments, a short section on the costs of education, and suggestions for further reading. Generally this is a worthy, sound, conventional careers book.

G.B.

The Way of a Countryman. IAN NIALL. Country Life, 1965. 25*s*.

Ian Niall presents a lifetime's experiences and observations garnered after giving full rein to an inborn hunter's instinct. This instinct is both predatory and protective; the sporting skill accompanied by deep concern for the welfare of the creatures pursued.

His recollections are marshalled to make each chapter the subject of a different sport—partridge, snipe, woodcock, pigeon, duck and goose, with others on rough shooting, grouse and black game, hares and foxes, fishing and pike. Vivid pen pictures of the terrain are accompanied by acute observations of wild life and advice on the sport itself, with colourful accounts of the author's own experience. This is interlarded with engaging sidelines, ranging from country legends of doubtful credulity to strange occurrences such as the cat who had an annual boxing match with a hare.

It is the way of a solitary countryman, the fishing heron, rather than the springtime rook among men, deeply in love with wild things and their habitats. Almost as much affection is lavished on the tools of his craft, especially the guns which hold a particular glamour for him.

Naturally the book will appeal primarily to the man who can compare his own sporting experiences with those recorded, but the attraction is a good deal wider than that. Much of its charm can be attributed to Mr. Niall's remarkable powers of description. The atmosphere so beautifully created in words is delightfully supported by the perfectly attuned drawings by *C. F. Tunnicliffe*.

Although he may regret the old remoteness of the countryside, the author accepts the problems of the present day, notably the conservation of resources and the intelligent training of the young. He pleads for education to correct irresponsible 'shore cow-boy' killing and for serious shooting men to take pains to pass on the best in shooting ethics: to shoot as a test of skill and to provide birds for the table, remembering that what is left undisturbed will be there to fly again and breed.

K.H.J.

Books Received

Meteorological Office Report for the year ending 31st December, 1964. H.M.S.O. 7*s*. 6*d*. (by post 8*s*.)

Forestry Commission Booklet No. 14. Rabbit Control in Woodlands. E. V. Rogers. H.M.S.O. 3*s*. (by post 3*s*. 3*d*.)

National Institute for Research in Dairying. Report 1964. University of Reading. 7*s*. 6*d*.

Documentation in Food and Agriculture, No. 70. Agricultural Education at University Level. Organisation for Economic Co-operation and Development. 24*s*.

Documentation in Agriculture and Food, No. 73. Advisory Work in Agricultural Marketing. Organisation for Economic Co-operation and Development. 9*s*.

Documentation in Food and Agriculture, No. 74. Obstacles to Shifts in the Use of Land. Organisation for Economic Co-operation and Development. 9*s*.

The Ministry's Publications

Since the list published in the October, 1965, issue of *Agriculture* (p. 509) the following publications have been issued.

MAJOR PUBLICATIONS

Experimental Husbandry Farms and Experimental Horticulture Stations 6th Progress Report, 1965 (New) 6*s.* 6*d.* (by post 7*s.*).

ADVISORY LEAFLETS

(*Price* 4*d. each—by post* 7*d.*)

No. 5. Common Scab of the Potato (Revised)

No. 10. Fruit Tree Red Spider Mite (Revised)

No. 205. Apple Powdery Mildew (Revised)

No. 478. Chemical Weed Control in Carrots, Parsnips and Parsley (Revised)

No. 537. Flies and other Insects in Poultry Houses (New)

No. 538. Handling of Purchased Seed Potatoes (New)

FIXED EQUIPMENT OF THE FARM LEAFLETS

No. 20. Electricity for Farm and Estate (Revised) 1*s.* 9*d.* (by post 2*s.*)

No. 33. The Concrete Road (Revised) 1*s.* 9*d.* (by post 2*s.*)

MECHANIZATION LEAFLETS

No. 1. Mowers (New) 1*s.* (by post 1*s.* 3*d.*)

No. 4. Machinery for Swath Treatment of Hay (New) 1*s.* (by post 1*s.* 3*d.*)

The publications listed above are obtainable from Government Bookshops (addresses below), or through any bookseller.

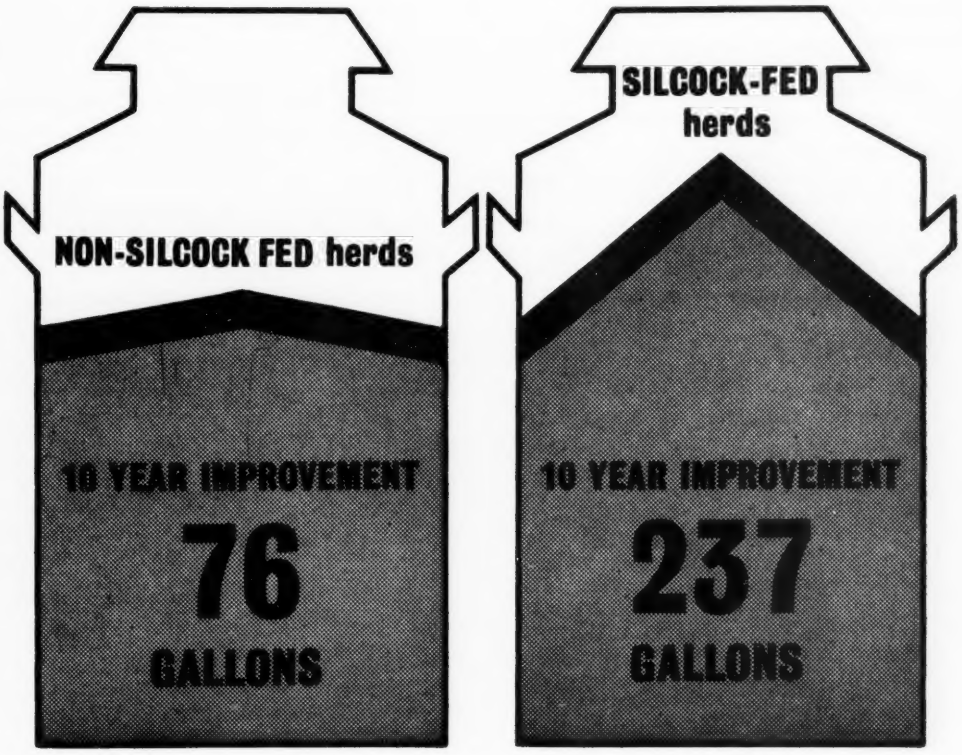
ACKNOWLEDGMENT OF PHOTOGRAPHS

We gratefully acknowledge permission to use the following photographs:

P. 521 *Farmer's Weekly*. P. 527 H. J. Hine. Pp. 530 and 532 R. Blair. Pp. 534 and 536 A. W. Prowel. P. 547 A. J. Brown. Pp. 553, 554 and 555 H. Ian Moore.

Printed in England for Her Majesty's Stationery Office
by Hull Printers Limited, Willerby, Hull, Yorks.

(K118) 72-1-65 11



In the last ten years, the yields of herds which are fed on foods other than Silcocks have risen by 76 gallons (figures based on NMR Reports issued by the MMB)

This commendable performance reflects great credit not only on better breeding and management, but also on improvements in the quality of feedingstuffs made by competitors.

IN THE SAME PERIOD, THE YIELDS OF HERDS FED ON SILCOCKS ROSE BY NO LESS THAN 237 GALLONS.

Last year, the average Silcock-fed herd increased its yields from the already considerable figure of 1,153 gallons to 1,161 gallons. Yields of herds NOT fed on Silcocks FELL from 996 gallons to 993.

Silcocks

R. Silcock & Sons Ltd, Stanley Hall, Liverpool 3.

OFFICIAL APPOINTMENTS

AGRICULTURAL CHEMIST
UGANDA

Required for research work on soil fertility problems connected with tropical rotations, manures and fertilizers.

Candidates must hold a second class honours degree in agricultural chemistry or chemistry, plus at least two years' post-graduate training or experience in soil science.

Salary scale £1,374—£2,757 a year plus 25% terminal gratuity. Passages provided. Generous leave.

Government quarters. Education allowances.

Appointment on contract for one tour of 21-27 months.

Applicants, who should be nationals of the United Kingdom or the Republic of Ireland, should apply for further details, giving full name and brief particulars of career and qualifications, quoting RC 213/183/022 to:

Appointments Officer,
Room 301,
MINISTRY OF OVERSEAS DEVELOPMENT,
Eland House, Stag Place,
London, S.W.1.

RESEARCH OFFICER (Virologist)
EAST AFRICAN COMMON SERVICES ORGANISATION

Required to study virus diseases affecting agricultural crops and to help with the Scientific Supervision of the East African Plant Quarantine Station.

Candidates must hold an honours degree in botany or agricultural botany, with experience in plant virology.

Salary scale £1,221—£2,097 a year plus 25% terminal gratuity. A 12½% increase in salary has been approved. Quarters available. Passages provided. Two year contract. Education allowances. Generous leave.

Candidates, who should be nationals of the United Kingdom or the Republic of Ireland, should write for further details, giving full name and brief particulars of qualifications and experience quoting RC 213/214/011 to:

Appointments Officer,
Room 301,
MINISTRY OF OVERSEAS DEVELOPMENT,
Eland House, Stag Place,
London, S.W.1.

SOIL CONSERVATION ENGINEER
UGANDA

Required to carry out soil conservation measures on projects, to check layouts, to train field staff and to collect data and prepare a handbook.

Candidates must hold a 2nd class degree in agricultural engineering, or a degree in soil conservation, or a degree in civil engineering and soil conservation. Experience in soil conservation is desirable.

Salary scale £1,374—£2,757 a year plus 25% terminal gratuity. Government quarters. Education allowances. Passages provided. 21 to 27 months contract. Generous leave.

Candidates, who should be nationals of the United Kingdom or the Republic of Ireland, should apply for further details, giving full name and brief particulars of qualifications and experience, quoting RC 213/183/020 to:

Appointments Officer,
Room 301,
MINISTRY OF OVERSEAS DEVELOPMENT,
Eland House, Stag Place,
London, S.W.1.

PLANT PHYSIOLOGIST
East African Common Services Organisation

Required to carry out research on agreed problems in the physiology of root development and growth in some East African economic plants, with particular reference to the effects of water stress.

Candidates must hold a good second class honours degree in botany, with particular emphasis on physiology ecology. Post-graduate experience in plant physiology research, with particular reference to water shortage on plant growths is desirable.

Salary scale £1,221—£2,097 a year plus 25% terminal gratuity. An increase of 12½% of existing salaries has been approved. Quarters available. Passages provided. Two year contract. Education allowances. Generous leave.

Candidates, who should be nationals of the United Kingdom or the Republic of Ireland, should write for further details, giving full name and brief particulars of qualifications and experience quoting RC 213/214/010 to:

Appointments Officer,
Room 301,
MINISTRY OF OVERSEAS DEVELOPMENT,
Eland House, Stag Place,
London, S.W.1.

OFFICIAL APPOINTMENTS

RUBBER DEVELOPMENT OFFICER
SARAWAK

Required to administer and supervise the Sarawak Government Rubber Planting Scheme at Divisional level, to train staff and small-holder producers in modern rubber technique and to carry out any other duties in connection with rubber as may be required.

Candidates must have a high standard of Secondary education, not less than six years' experience in all aspects of rubber planting and processing, and a sound working knowledge of Malay or Chinese. A pass in the Incorporated Society of Planters examination in Estate General practice would be an advantage.

Salary range £1,470 to £2,730 a year plus terminal gratuity. Passages provided. Government quarters. Child allowance. Education allowances. Two- to three-year contract. Generous leave.

Applicants, who should be nationals of the United Kingdom or the Republic of Ireland, should write for further details, giving full name and brief particulars of qualifications and experience, quoting RC 213/155/010 to:

Appointments Officer, Room 301,
MINISTRY OF OVERSEAS DEVELOPMENT,
Eland House, Stag Place,
London, S.W.1.

SOIL SURVEY OFFICER
UGANDA

Required to carry out soil surveys as a member of a land planning team working on the development of group farms.

Candidates must hold an honours degree in either natural science, agriculture or geography, with, if possible, post-graduate training or experience in soil science.

Salary scale £1,374—£2,757 a year, plus 25% terminal gratuity. Passages provided. Education allowances. Government quarters. 21 to 27 months contract. Generous leave.

Candidates who should be nationals of the United Kingdom or the Republic of Ireland should write for further details, giving full name and brief particulars of qualifications and experience, quoting RC 213/183/019 to:

Appointments Officer,
Room 301,
MINISTRY OF OVERSEAS DEVELOPMENT,
Eland House, Stag Place,
London, S.W.1.

AGRICULTURAL OFFICER
BASUTOLAND

Required to supervise, train and advise field staff in the newly created extension and conservation division. Candidates must possess a degree in agriculture or science plus a diploma in agriculture, or a diploma in agriculture with wide practical experience.

Salary. £1,135—£2,343 for degree holders or £996—£1,947 for diploma holders, plus 25% terminal gratuity. Revision of salaries is under consideration. Passages provided. Education Allowances. Government quarters. 2-3 year contract. Generous leave.

Candidates should write for further details, giving full name, and brief particulars of qualifications and experience quoting Ref. RC 213/18/02 to:

Appointments Officer,
Room 301,
MINISTRY OF OVERSEAS DEVELOPMENT,
Eland House,
Stag Place,
London, S.W.1.

OFFICIAL APPOINTMENTS

AGRONOMIST
TANZANIA
(TANGANYIKA AND ZANZIBAR)

Required to be responsible for a programme of field experimentation, after involving many district trials off the main research centres.

Candidates must hold a degree in agriculture or horticulture, with at least two years' experience in the field of experimentation or two years' post-graduate training.

Salary £1,329—£2,757 a year plus a 25% terminal gratuity. Passages provided. Education allowances. Generous leave. 21-27 months contract.

Applicants, who should be nationals of the United Kingdom or Republic of Ireland, should write for further details, giving full name and brief particulars of qualifications and experience, quoting RC 213/173/06 to:

Appointments Officer,
Room 301,
MINISTRY OF OVERSEAS DEVELOPMENT,
Eland House, Stag Place,
London, S.W.1.

AGRICULTURAL ENGINEER
ZAMBIA

Required as an extension specialist in agricultural mechanisation with specific responsibilities for training.

Candidates must have a B.Sc. degree in agriculture with a post-graduate diploma in agricultural engineering. Experience in tractor mechanisation schemes in Africa and the problems associated therewith is desirable.

Salary scale £1,255—£2,600 a year. 25% gratuity. Passages provided. Education allowances. Government quarters. 3 year contract. Generous leave.

Candidates who should be nationals of the United Kingdom or the Republic of Ireland, should write for further details giving full name, qualifications and experience, quoting RC 213/132/028 to:

Appointments Officer,
Room 301,
MINISTRY OF OVERSEAS DEVELOPMENT,
Eland House, Stag Place,
London, S.W.1.

OIL PALM AGRONOMIST
SARAWAK

Required to open up and establish a new experimental Station, mainly to be concerned with oil palm and other crops new to Sarawak, e.g. cocoa and hemp.

Candidates must hold a degree in Agriculture and have had post-graduate training preferably with previous experience as an agronomist.

Salary scale £1,680—£2,905 a year plus substantial terminal gratuity. Passages provided. Education and child allowances. Government quarters. 24-36 month contract.

Candidates, who should be nationals of the United Kingdom or the Republic of Ireland, should apply for further details, giving full name and brief particulars of qualifications and experience, quoting RC 213/155/08 to:

Appointments Officer,
Room 301,
MINISTRY OF OVERSEAS DEVELOPMENT,
Eland House, Stag Place,
London, S.W.1.

CHIEF AGRICULTURAL ECONOMIST
ZAMBIA

Required to assume responsibility under the general direction of the Director of Economics and Marketing for the Economics Branch, to formulate detailed advice on agro-economic matters in the field of production and marketing, including project appraisals and field surveys and the compilation and dissemination of market intelligence.

Candidates must have an honours degree in economics or agricultural economics or equivalent, plus about ten years appropriate post-graduate experience in agricultural economics. A post-graduate degree would be an advantage.

Salary £2,655 a year. 25% gratuity. Passages provided. Government quarters. Education allowances. 3 year contract. Generous leave.

Candidates, who should be nationals of the United Kingdom or the Republic of Ireland, should write for further details, giving full name, qualifications and experience, quoting RC 213/132/016 to:

Appointments Officer,
Room 301,
MINISTRY OF OVERSEAS DEVELOPMENT,
Eland House, Stag Place,
London, S.W.1.